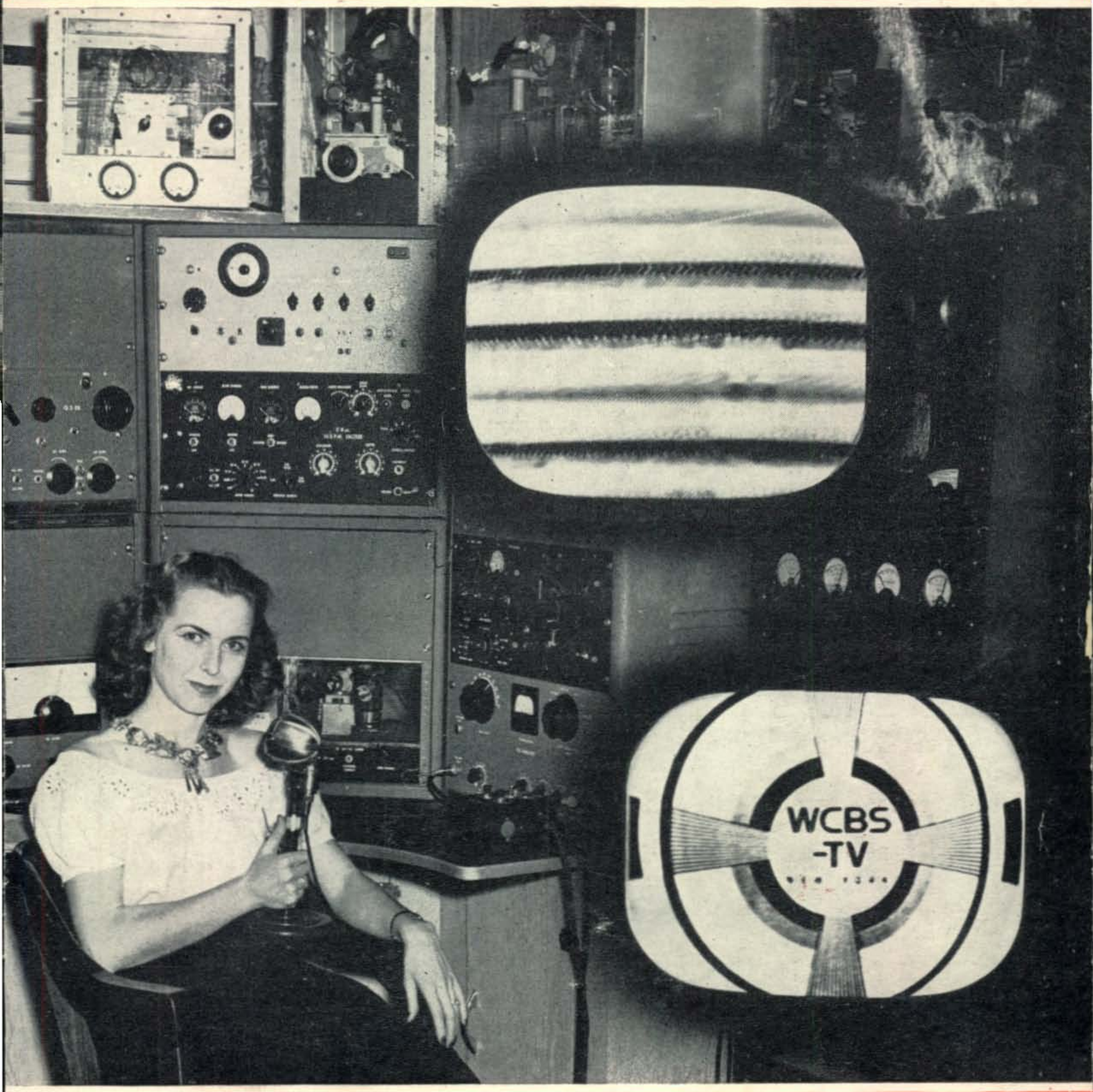
MAY, 1949

CQ

The Radio Amateurs' Journal

35¢



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(Double Pole, Double Throw available on special order at $1.00 list extra.)

- Press lever lightly for "On". Switch closes.
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- To release lock, touch lever lightly; switch returns to "Off" position.

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Switch locked after pressing red button. Touch lever for release.

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Are *new* audio-amplifier tube kayos hiss, hum, and microphonics?

THE KEN-RAD 12AY7 MINIATURE— A REAL CHAMPION, WITH STANDOUT QUALITIES OF DESIGN!

12AY7
MEDIUM-MU TWIN TRIODE

KEN-RAD

Filament voltage	6.3 v, 12.6 v
Filament current	.3 amp, .15 amp
Plate voltage	250 v
Plate current	3 ma
Amplification factor	40
Grid bias	—4 v
Transconductance	1,750 micromhos

WHEN building a high-gain, low-level amplifier, your guard must be up against hiss, hum, and microphonics — the "unholy three" in audio circuits. You're safer from these bugaboos if (1) your circuit is properly designed, (2) you have the right audio-amplifier tube.

Selection of the latter narrows down quickly to the Ken-Rad 12AY7 — the pace-setting new miniature specially developed by Ken-Rad and General Electric designers to reduce the noise by-products in audio amplification.

In originating Type 12AY7 with its low-noise and low-microphonics character, a miniature-tube design was chosen not alone because miniatures are modern, but because small electrodes mean low mass . . . and low mass aids in reducing microphonic output.

The result is a compact twin triode with a place to itself in the ham's list of tubes for early application . . . a *new* miniature to give your rig *new* clean signal characteristics.* Ask your Ken-Rad distributor or dealer to show you the 12AY7. Study how this finely engineered tube is built. Here are quality of design and quality of manufacture, the two combining for topnotch audio-amplifier performance!

*Illustrating the kind of amplifier which can be built with the 12AY7, a recent article in tne trade press describes a wide-frequency-response amplifier using 3 of these tubes with a harmonic-distortion figure of only ½ of 1 per cent, and the average noise 87 db down (from a +24 dbm level).

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LOOK BEYOND THE DATA SHEET!

182-HA27

KEN-RAD *Radio Tubes*
PRODUCT OF GENERAL ELECTRIC COMPANY
Schenectady 5, New York

YOUR PREFERRED SOURCE FOR AMATEUR TUBES IS YOUR NEARBY KEN-RAD DISTRIBUTOR OR DEALER

"Highest Praise for BUD Products" . . .

says

Bud Radio,
2118 East
Cleveland,

Atten

Gentlemen:

In reply to your letter of 1/28/49 inquiring about the "new" W9KNH, I am pleased to enclose a photograph.

All cabinets, panels, chassis, chassis mounts, standoffs, coils, and condensers, are of BUD manufacture.

The kilowatt transmitter is conventional except it is dual channel, to cover any two amateur bands with instantaneous changing by relays. Compactness is made possible by using tetrode 4-125A pp finals utilizing your HC1636A condensers floated in the 2500 volt plate circuits.

On the desk there is also a dual channel 40 watt radiotelephone using BUD parts. When the KW transmitter is used the small modulator automatically becomes the speech amplifier driving the pp 805 modulators.

Only the highest praise can be voiced for your products. The proof of performance is in my log book—more than 100 foreign stations have been contacted in the first 100 hours of operation on 20 meter phone. The 10 meter channel has not been operated so many hours but the average record is about as good.

Tnx BUD for manufacturing fine parts for a bigger and better W0KNH.

73's

Bob Cooper
W9KNH

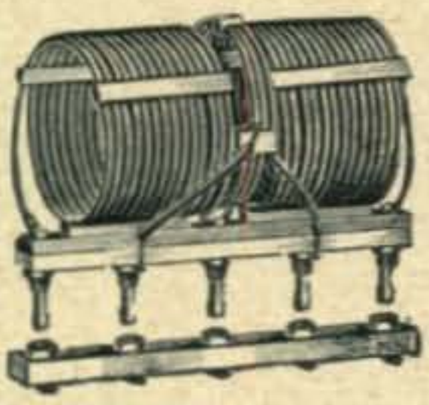
Quincy, Illinois
February 1, 1949

This testimonial is one of many we constantly receive from users of Bud products. All cabinets, panels, chassis, coils, and condensers in the W9KNH rig are manufactured by Bud.

Here is proof of the fact that whatever your needs are for radio and electronic parts, you are sure of getting top performance from Bud products. They embody the latest engineering developments and are made of the best materials by skilled craftsmen.

For the highest quality at the lowest price always insist on Bud products.

The BUD line offers you the widest selection



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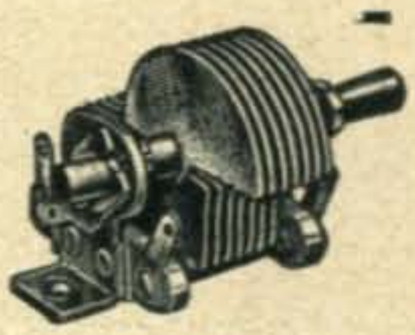
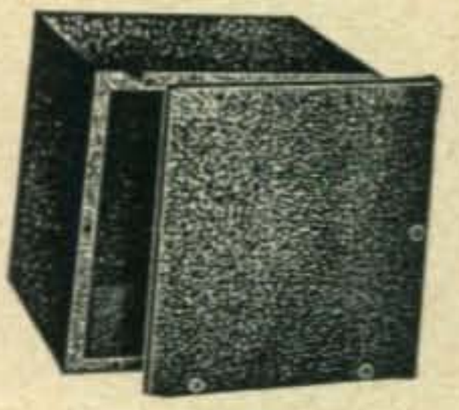


CONDENSERS



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The Radio Amateurs' Journal

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Vol. 5 MAY, 1949 No. 5

In This Issue

COVER—Put a pretty girl at the microphone and the rig has to perform—but not necessarily without TVI. So while Louise, XYL of W1DBM, was operating, OM Rand took the photographs showing what Channel 2 looked like before and after corrective measures had been taken. The 28-mc 750-watt AM transmitter was operating in both shots, with the TV receiver in the same room. The debugged PA is inside the copper screen housing in the upper right-hand corner. You, too, can achieve W1DBM's effective results by doing your TVI lessons starting on page 20.

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Designed for

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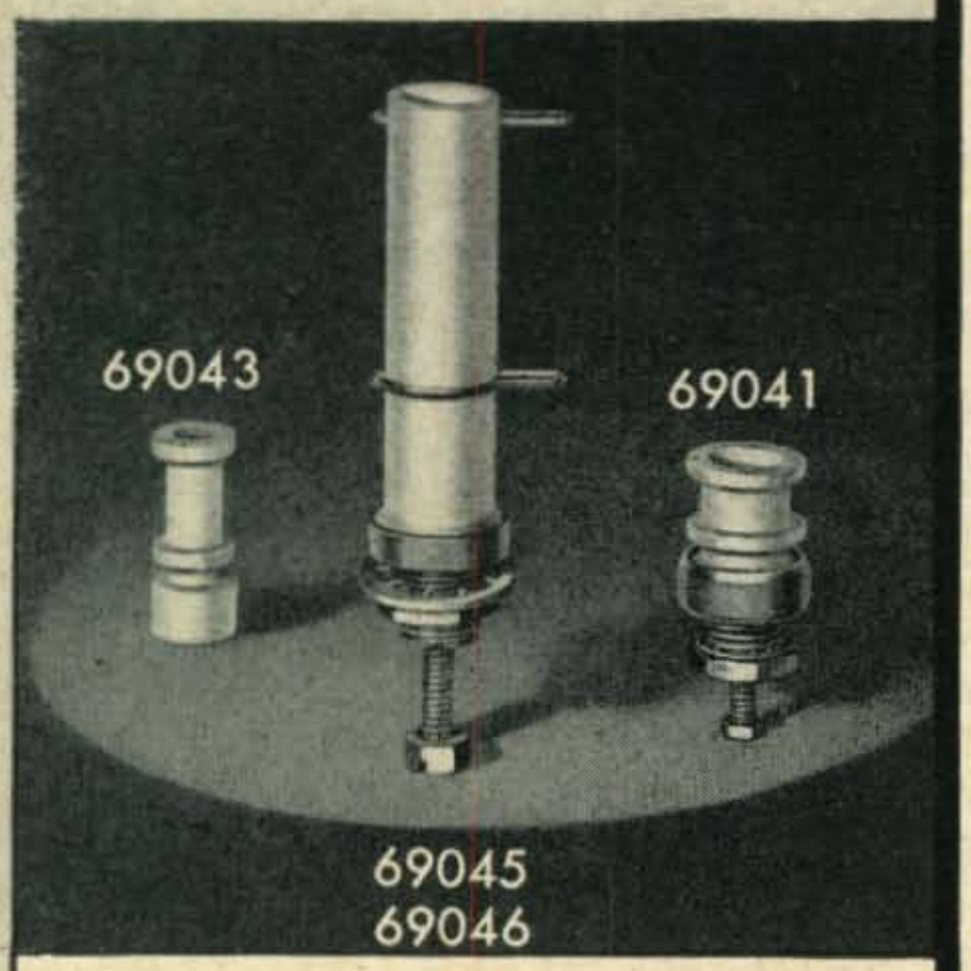
Application



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Letters

Titles Can Be Misleading

155 Saint Elmo Way, San Francisco, Cailf.

Editor, *CQ*:

This is being written for inclusion in your "Letters to the Editor" department in the same issue in which my "Single-Sider" will appear. That story was not an easy one to write for a number of reasons, not the least of which is that the reader can't *hear* one of these units and the writer therefore is forced to draw the best word picture he can and hope that the relatively enormous improvement possible can be appreciated by a comparison of the selectivity curves shown. The expert will see the story at a glance, but we don't need to write articles for the experts—they already know the answers. The point I want to make is that the entire scheme of single-sideband reception as I have outlined it is in no manner untried or unproven. It is entirely commonplace in carrier telephony—the Lynch filter mentioned is part of a carrier job—and has been used for a great number of years. Why we as amateurs haven't attempted to apply similiar principles I can't imagine, unless it is that we haven't known much about them.

Among other things, the carrier telephone services are dealing with an ever-expanding demand for service and the number of voice channels that can be placed on a pair of wires is not without limitation. So it is then that they take up as little room as possible for a given voice channel, to the end that the greatest possible number of voice channels can be used. They thus restrict the width of the channel by limiting the frequency response and additionally, use single-sideband.

It seems to me that we as amateurs are likewise making demands for more service but still in the same channel width. Every phone amateur should realize by this time that SSSC is a definite answer to this problem but even with the good send-off it has received in *CQ* and other amateur papers, and in spite of the fact that it is widely used commercially, there are those who still doubt. Well, single-sideband *reception* when available is a step in the right direction, although undeniably it does not provide the peak power and some other advantages of SSSC. I believe I can safely say, however, that the man who builds and uses a Single-Sider will be an immediate convert to SSSC. If you look at this unit in another light—work it backwards, in fact, you have the start of a beautiful SSSC transmitter. It takes the l-f signal and ultimately turns it into audio; why, then, can't it reverse the procedure and change from audio to l.f.? It can.

One other thing. I always dislike writing an article that must be dependent upon some purchased item for its success, but here is an instance in which I am completely stymied. Those precise band-pass filters are almost impossible to make without the proper know-how and precision test equipment. In spite of this I feel justified in asking you to present the article because the final result is so worthwhile. Use one with any receiver and you will be amazed. Use one with the best of the modern receivers and you get effects that savor

Monitor Modulation Percentage and Speech Quality

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MODULATION METER

TYPE X-7018

NOW you can monitor your modulation percentage *and* speech quality with a fine instrument available at low cost. Percentage modulation can be read directly on the meter. Headphone jack, conveniently provided, also permits monitoring your signal quality to check for hum or audible distortion.

Compactly designed to fit the most cramped operating table, this precise Modulation Meter will be of great assistance in complying with FCC regulations on overmodulation. It will also help keep your average modulation percentage up in the effective region between 60% and 90%. Indicates carrier shift.

Take advantage of this new low price! See Sylvania's Modulation Meter Type X-7018 at your distributor today! *Sylvania Electric Products Inc., Radio Division, Emporium, Pa.*

SYLVANIA ELECTRIC

ELECTRONIC DEVICES; RADIO TUBES; CATHODE RAY TUBES; FLUORESCENT LAMPS, FIXTURES, WIRING DEVICES, SIGN TUBING; LIGHT BULBS; PHOTOLAMPS

a bit of black magic. It seems though that more and more we as amateurs are going to be confronted with the necessity of conforming to "the best that the state of the art will permit." This never seems possible without cost. Anyway, the Single-Sider.

Many of your readers will doubtless observe that the audio filters I have previously discussed in *CQ* have all the earmarks for a filter to lop off one sideband. Designed for a higher i.f., say cut-off around 15 kc, they can really do away with one sideband but the bandwidth will then be strictly dependent upon the receiver i.f. There is even the possibility that such a simplified filter may be arranged circuit-wise so that either the high or the low-frequency sideband may be rejected regardless of the configuration of the filter (high or low pass). As I see it, the advantages of good filters in i-f and audio stages are so evident that no modern amateur station can afford to ignore them.

Here then is simply the statement of a few thoughts that were a bit too personal to be included in the article proper. Why bring them up at all? Merely so that some readers who might read your "Letters" deparment and skip the other article as too technical or not applicable will give the subject some thought. The tag line—all the selectivity that anyone can use—plus single-sideband.

Clayton F. Bane, W6WB

Pressure From TVI Continues

87 Mount Vernon Ave., Waterbury 73, Conn.

Editor, *CQ*:

The "lot" of the ham is most questionable. I have been licensed about 19 years and never thought it would come to pass where the hams might be made extinct.

BCI was bad, but could be coped with. TVI is a problem for the lab more than the practicing amateur. Commercial built television sets are built, as you know, with price in mind—little thought of selectivity—hence our dilemma.

I am under the impression that the FCC is trying to be reasonable with us but as far as I know they have come out with no public statements relative to what we can and cannot do.

I realize television is the coming thing, but the way things are going there just won't be any room in the picture for the ham. I, as well as many, I presume, am getting discouraged to the point of wondering when we'll quit the game all-together. Should this feeling become universal the country will lose forever a most valuable pool of radio electronic talent.

It's a real national problem—and in the meantime we are drifting.

E. A. Madison, W1CNV

---

162 Main St., East Rockaway, L. I., N.Y.

Editor, *CQ*:

At the last meeting of the Nassau Radio Club I was instructed by the membership to inform you of our whole-hearted approval of the editorial stand taken by *CQ* magazine in regard to the problem of television interference.

(*Continued on page 83*)

...GO PR

and KNOW WHERE *you are!*

"Looks like you're out of the band, old man. Of course, my receiver may be off but according to my readings you're . . . etc." — "There's a CW sig on you . . . better check your frequency" — "I can't find you since you moved up, Bill. You said you'd move up 25 kaycees but can't hear you there" — "Sorry, Charlie, I am monitoring the spot set for our sked but no soap. Guess you must be on the wrong frequency." — *How much of this kind of talk do you hear these days?* Plenty. Unless you are CRYSTAL CONTROLLED you can never be sure *where* you are. Get set to enjoy yourself

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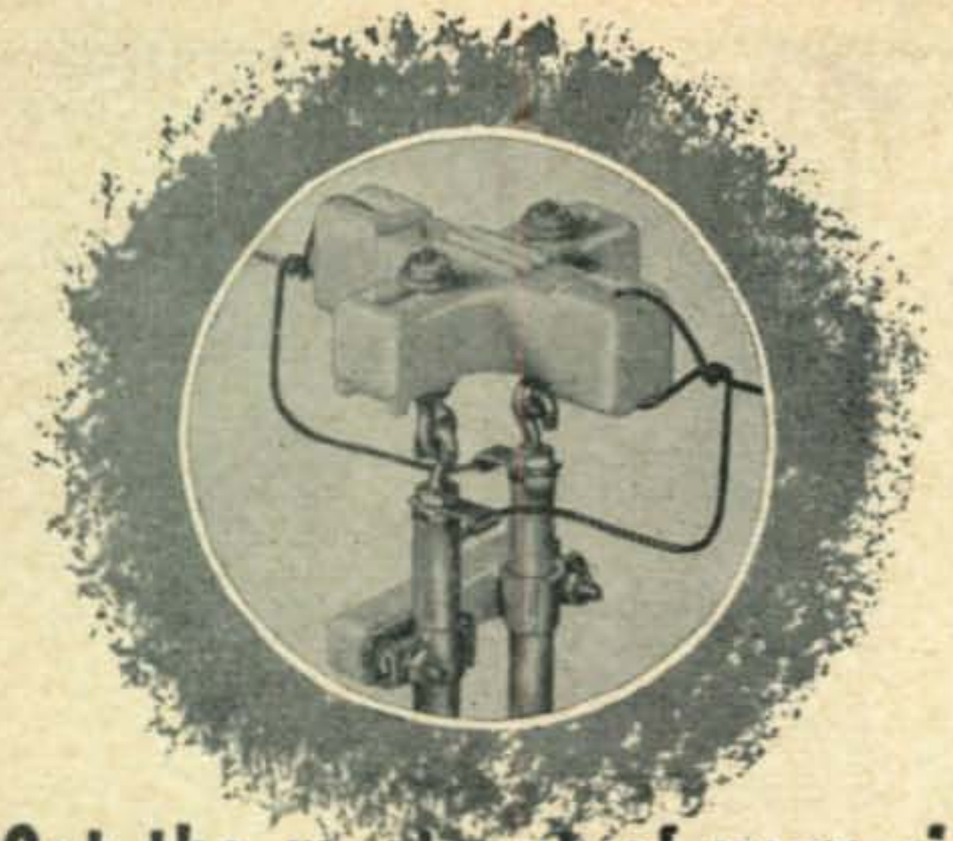

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Amateurs seeking peak efficiency will be taking a long step toward their goal by using the amazingly efficient JOHNSON "Q" antenna.

This system almost invariably results in a substantial increase in radiated power.

JOHNSON "Q's" are available for 2, 6, 10, 20 and 40 meters. The 2Q and 6Q use aluminum tubing for the radiating portion as well as for the matching section.

A special application of the "Q" system, applications include half-wave doublet, either horizontal or vertical, harmonic or "longwire" radiator, radiator reflector, radiator director, "V" beam, JOHNSON "Q" beam and others. "Q" beam consists of two half-wave "Q" antennas spaced 1-5 wave.

In ordering the beam, specify two "Q" antennas for the lower frequency of the two bands desired. For example, if you want a "Q" beam to operate on 10 and 20 meters order two JOHNSON "Q's" for 20 meters.

Antennas include all necessary aluminum tubing, suspension assemblies, spacing bars, hardware and detailed instructions.

Advantages of "Q" System

1. **Much greater radiation than obtained with ordinary non-matched feeder.**
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5. **No critical feed line lengths.**
6. **Permanent low-loss construction. Insulation will not weather or deteriorate.**
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8. **May be used with any antenna having a radiation resistance of 37 to 172 ohms and transmission line of 400 to 600 ohms impedance.**

Order from your dealer or write for brochure entitled "The JOHNSON 'Q' In Popular Antenna Applications."

JOHNSON

E. F. JOHNSON CO. WASECA, MINN.

Feenix, Ariz.

Deer Hon. Ed:

Ha! I repeating, double Ha! Authors who are riting some of these articles in radio mags should be better off having ragchews on air than riting said articles. Scratchi are particularly referring to one recent article, from which I are quoting in part "the equipment described herein can be duplicated quite inexpensively, as most of the parts will be found in the average ham's junk box." What average ham, John D. Rockamint?

I are admitting that Scratchi are almost taken in. After reading article I are getting urge to construct said hunk of gear, so I are dashing madly down to basement to where I are storing spare parts. This are first requiring herculean efforts on Scratchi's part of removing couple hundred pounds of old newspapers and magazines from top of carboard boxes in which parts are being reposed. It are also requiring recess of half an hour when I are spotting luscious bathing beauty on cover of magazine, so I are having to look over whole magazine. Hot doggitty!

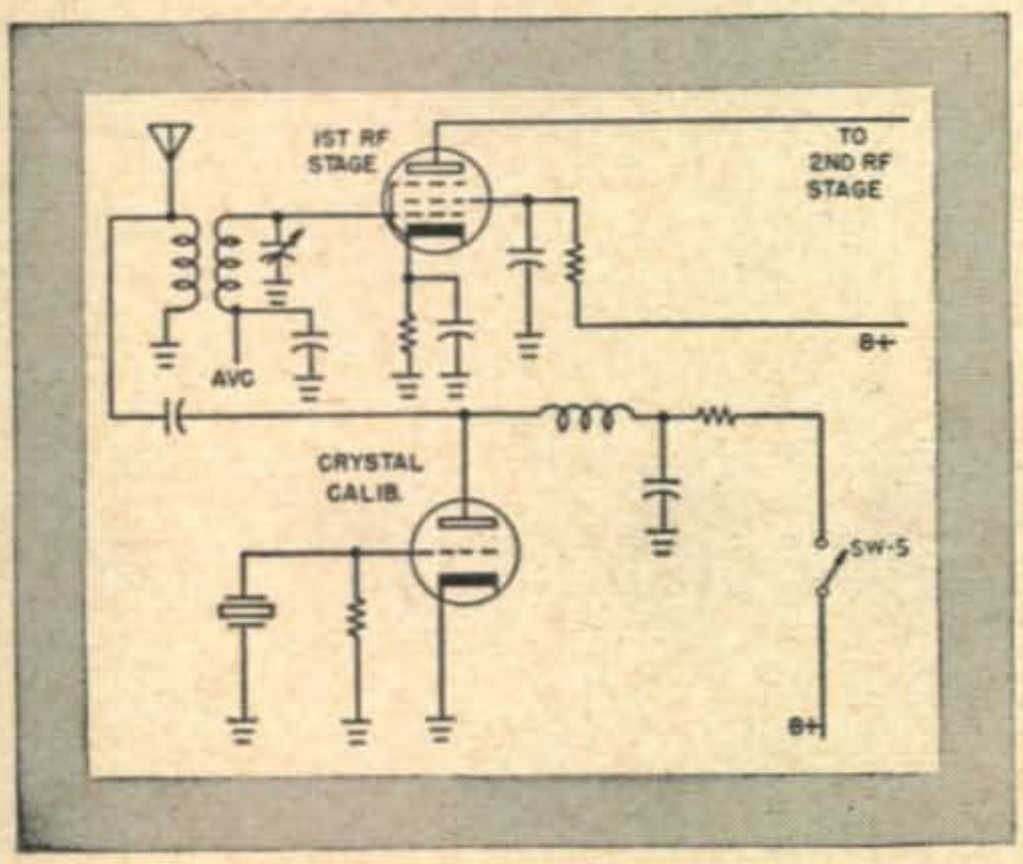
Previously I making out list of parts needed for junk-box special, and I are putting this on top pile of papers. First box I looking into evidentally containing corpses of BC sets what are having seen sunnier days. These are being put aside as a source of resistors and condensers and toobs. I are taking first chassis over to list, and are about to compare to see what resistors and condensers are needed, when are noting that manufacturer are not bothering to mark same. Hon. Ed., are this legal? Of course, they are all marked, such as C_{107}, R_{24} and such like that there, but unless I finding someone with circuit diagram for 1924 radio, radio are pretty worthless. Others in same shape. Even the toobs are not seeming too modern. Couple of 27s, six or seven 26s, and one 80 with broken filament.

Next box are looking more promising. Many small boxes on top. First containing slitely rusty screws and nails. Next containing cup hooks I are getting to put up for Brother Itchi and forgetting. Old cigar box with couple three-gang condensers. Small box of burned out 30 ampere fuses. Metal tin of —ouch—insulated staples. Candy box full of old i-f transformers, home-made r-f chokes, and defunct wave-trap for BC set, cigar box of toobs, 24-As, 6C6s, and a 6L6 with bakelite key broken off, straight key with knob missing. Even a bunch of QSL cards from last QTH wrapped in brown paper.

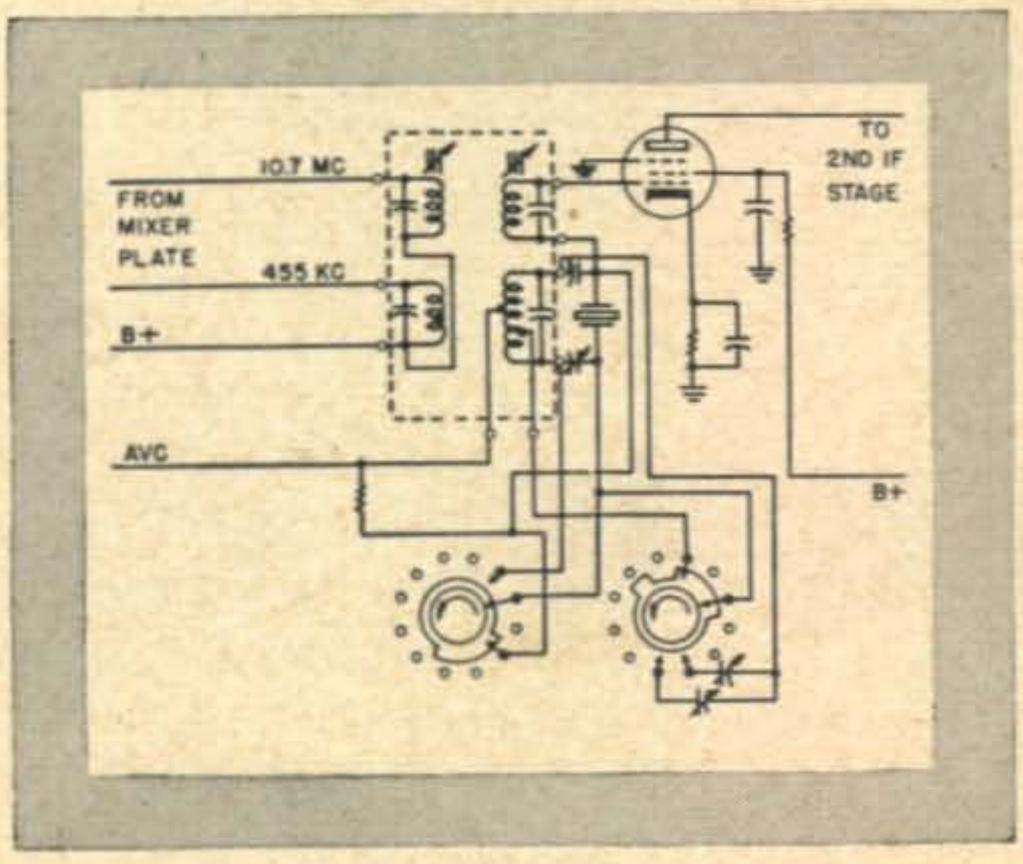
Foof! Next box heavier, on acct. containing several misc. size field coil speakers, some with pieces of cone still on. Are figuring on using wire on coils for antennas some day. Small box are containing old rubber hose, screen door hinge and screen door spring, roll of iron wire for hanging pictures—how come this are with radio parts?

(*Continued on page 89*)

Two Reasons Why The SX-62 Tops Other Broadcast Receivers



CALIBRATION OSCILLATOR for determining exact frequency at any time. A flip of toggle switch SW-5 feeds a 500 kc unmodulated signal into the antenna coil; amplified harmonics appear at 500 kc intervals on all bands up to 32 Mc. Just zero beat the tuning gang with the nearest harmonic and use the "Reset" control to correct the dial pointer.



SIX POSITION SELECTIVITY control. Here's that extra bit of flexibility no experienced listener would be without. The three sharpest positions use the Xtal bridge circuit above. The other three positions effect necessary changes by varying the coupling in later IF coils not shown. 10.7 Mc IF is used on two highest bands.

SX-62—$269.50

BEFORE YOU BUY—or let an SWL friend buy—see and try the SX-62. There is no other set in the world like it. None with such frequency range—540 kc to 110 Mc, such ease of tuning—over 150 stations marked on the dial, or such flexibility of control. Truly, a radio that is all radio! Other features include temperature compensated oscillator with voltage regulator, two RF and 3 IF stages, 14 tubes plus rectifier and regulator.

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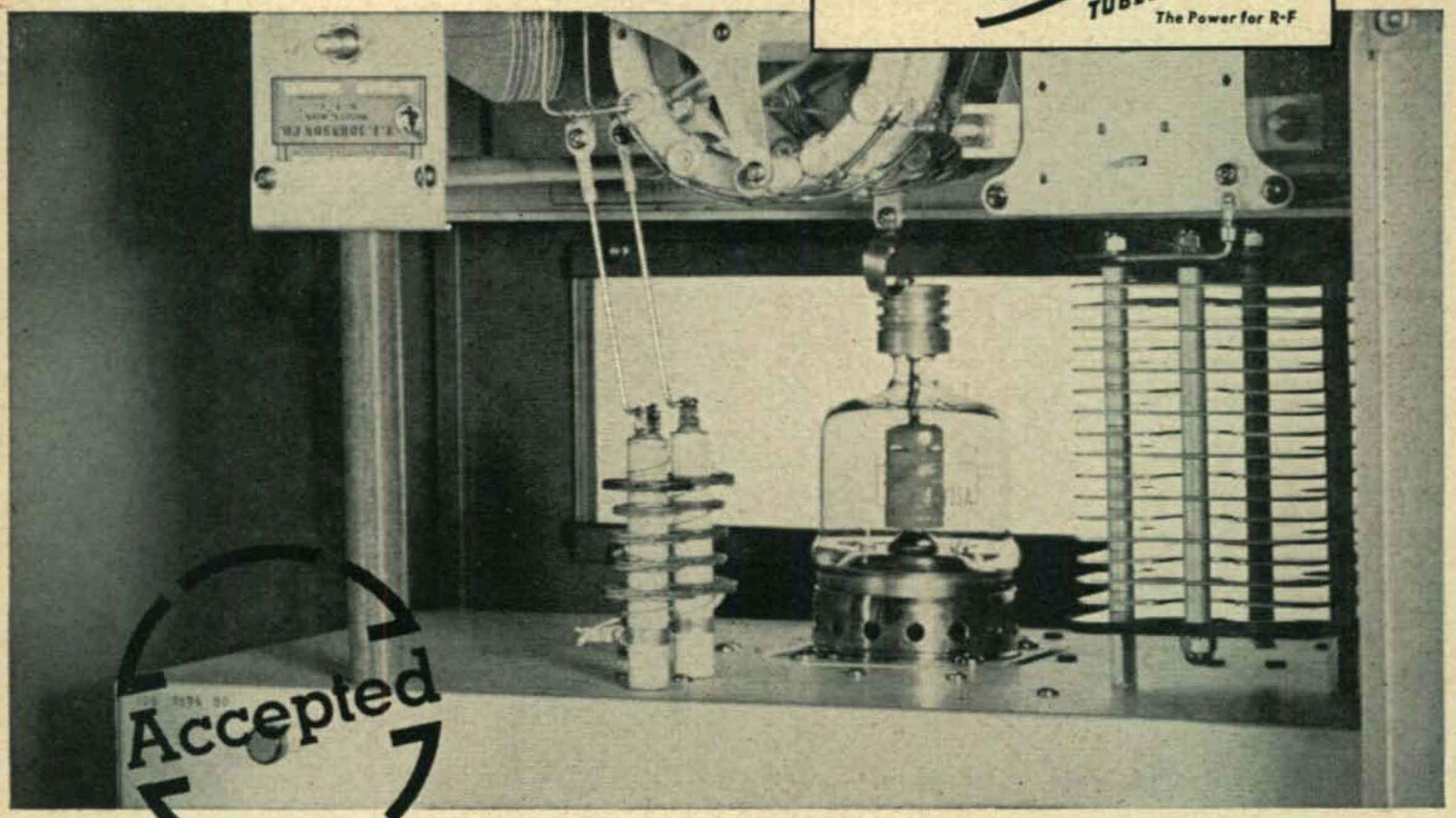
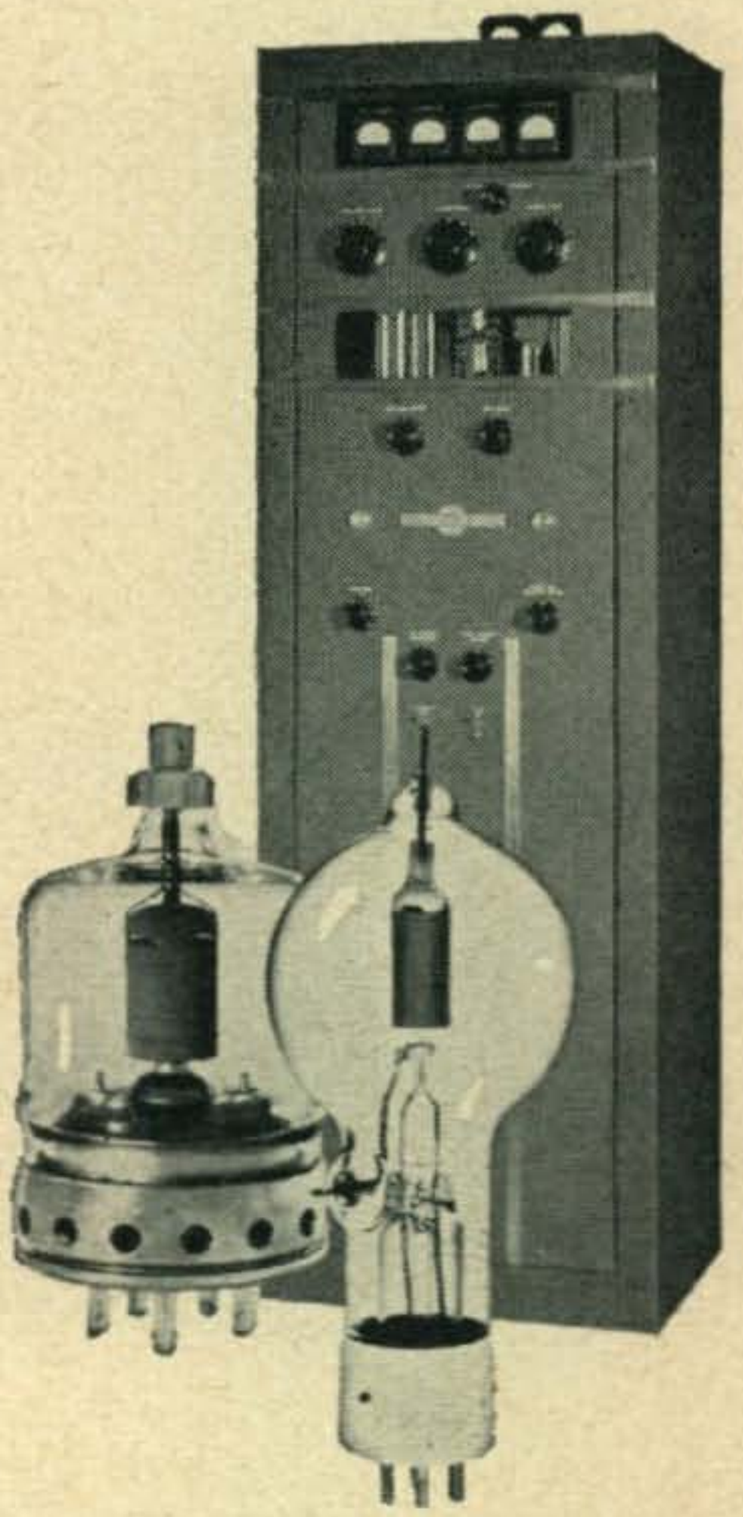


Accepted

COLLINS 30K-1 TRANSMITTER . . . and EIMAC TUBES



The 30K-1, popular transmitter designed and built by Collins Radio, handles 500 watts input on CW and 375 watts input on phone. Among its many desirable advantages are clean sharp keying, permeability tuned oscillator, speech clipper, band switching, 100% modulation, break-in operation, and coverage of 80, 40, 20, 15, 11 and 10 meters. It is designed to fill the needs of both the brass-pounder and the push-to-talk man.

The engineers at Collins, like other leading engineers, specified Eimac tubes in key sockets to assure the utmost performance and reliability of operation.

One Eimac 4-125A heads the tube line-up, providing final r-f amplification. Two Eimac 75TH triodes serve as class-B modulators.

Whatever your power aspirations . . . there is an Eimac tube designed specifically to do the job better . . . Consult your jobber or write direct for data,

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John H. Potts

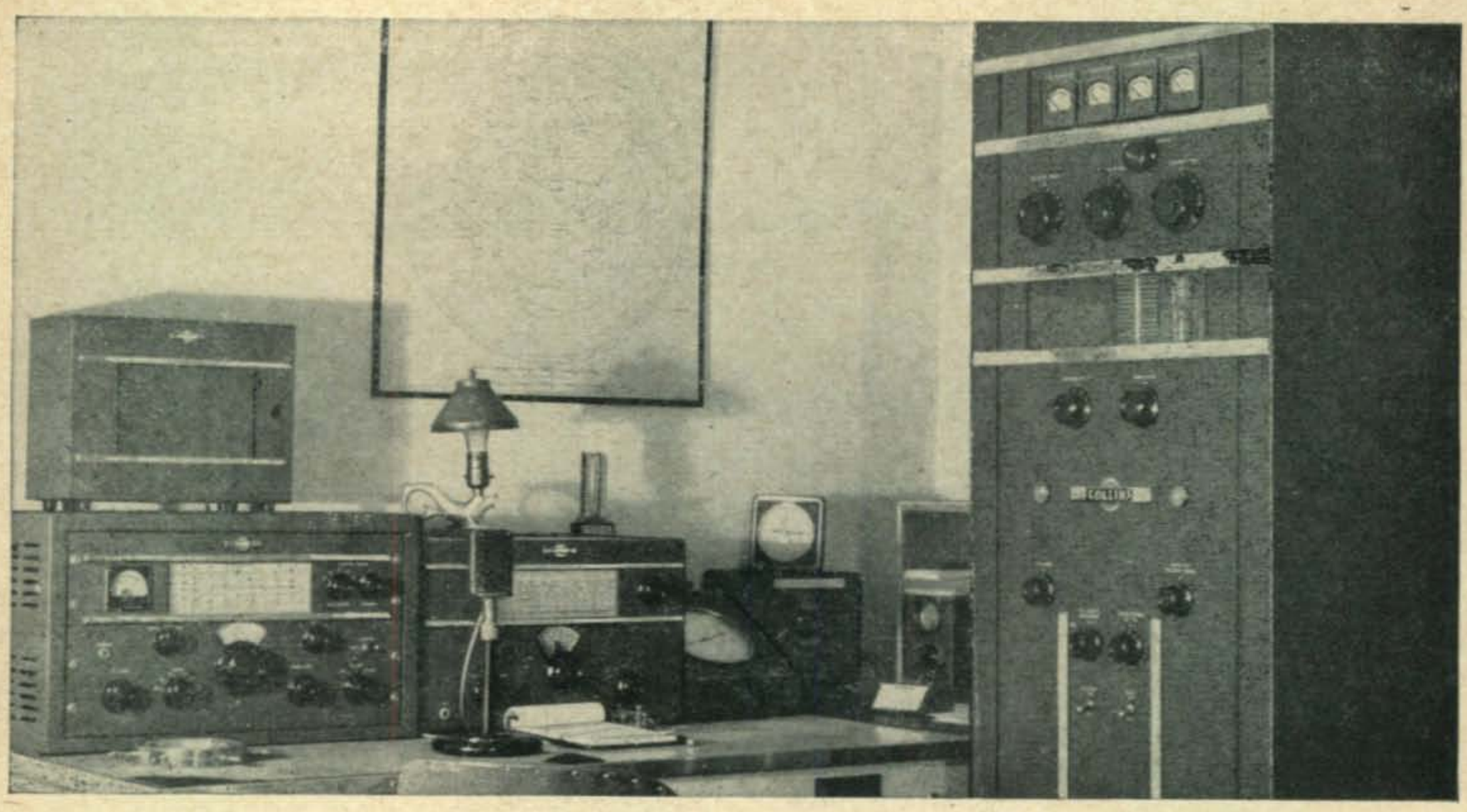
1892-1949

NOT every ham has a ticket and operates a station on the air. There are many individuals who believe in amateur radio as much as the most ardent experimenter or rabid operator. Each in his own way does his share in perpetuating the hobby . . . in making it more fun and of greater service to the community. Such a man was John Hollister Potts, Publisher of CQ, whose untimely passing must now be logged.

John Potts, one of the early pioneers in the development and progress of the electronic arts, devoted his entire life to the development of the industry—as an editor, as author of innumerable articles, and in engineering capacities with the Radio Corporation of America, General Electric, and the Sperry Gyroscope Company. His keen perception of the tremendous importance of the science of electronics inspired him to devote his final energy to Radio Magazines, Inc., a publishing venture dedicated to the widespread dissemination of scientific facts for electronic specialists.

In January, 1945, expanding his publishing venture, John Potts became the co-founder of CQ. The choice of the amateur field was dictated to a large degree by a creed which has become a byword to his associates, "Work and serve in a field you love." In this spirit of friendliness, and with his advice and counsel, CQ has grown constantly in scope and stature.

John Potts, born November 8, 1892; died, March 16, 1949. Author, editor, publisher, engineer, and amateur. R.I.P.



Thanks, W6OKQ, for proving the point

• When H. P. Westler, W6OKQ, bought his 30K-1 he was dubious. Read what he says in a recent letter:

"Ever since Eimac tubes have been available I have been running fairly high power—never less than 650 watts. A few months ago, when I made my decision to purchase a Collins 30K-1 with a phone input power of 375 watts, I was quite concerned in my own mind as to whether I would ever be happy and whether I would get results comparable to those I had been accomplishing. As you know, I am strictly a phone man and I think the following results which have been accomplished during the last few months since I purchased this new Collins transmitter speak for themselves. These contacts have all been made on 20-meter phone:

VK2AJX	5-9
J9ACB	5-8
I1RC	5-8
ZS1CJ	5-9
G2PU	5-9+
SM4KP	5-9+
GW4CZ	5-8-9
OH6NS	5-8
PAØBM	5-6
OZ7FL	5-9
HK1DZ	5-9+
GM3BN	5-7-9
ZL1DL	5-9
KA1AI	5-9
CT1PR	5-8-9
VP3TY	5-8-9
ZE2JQ	5-9
CR7BC	5-8
ZC6XY	5-8-9
FQ8SN	5-8
VU2ET	5-9+

"I thought perhaps others might have had the same idea I had and that possibly you could use my past experience in proving the point that a well designed piece of equipment, such as this Collins 30K-1, does and will compete with the kilowatt rigs. Of course I have had many, many more contacts and lots of duplications of the same, but to receive reports like the above in the crowded 20-meter phone band shows that your equipment definitely can compete."

* * *

• Footnote to amateurs who are also professionals: You can expect the same high performance from Collins broadcast equipment and Collins airborne and ground station communication and navigation gear.

IN RADIO COMMUNICATIONS, IT'S . . . COLLINS

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

11 West 42nd Street, New York 18. N. Y. 458 South Spring Street, Los Angeles 13, Calif.

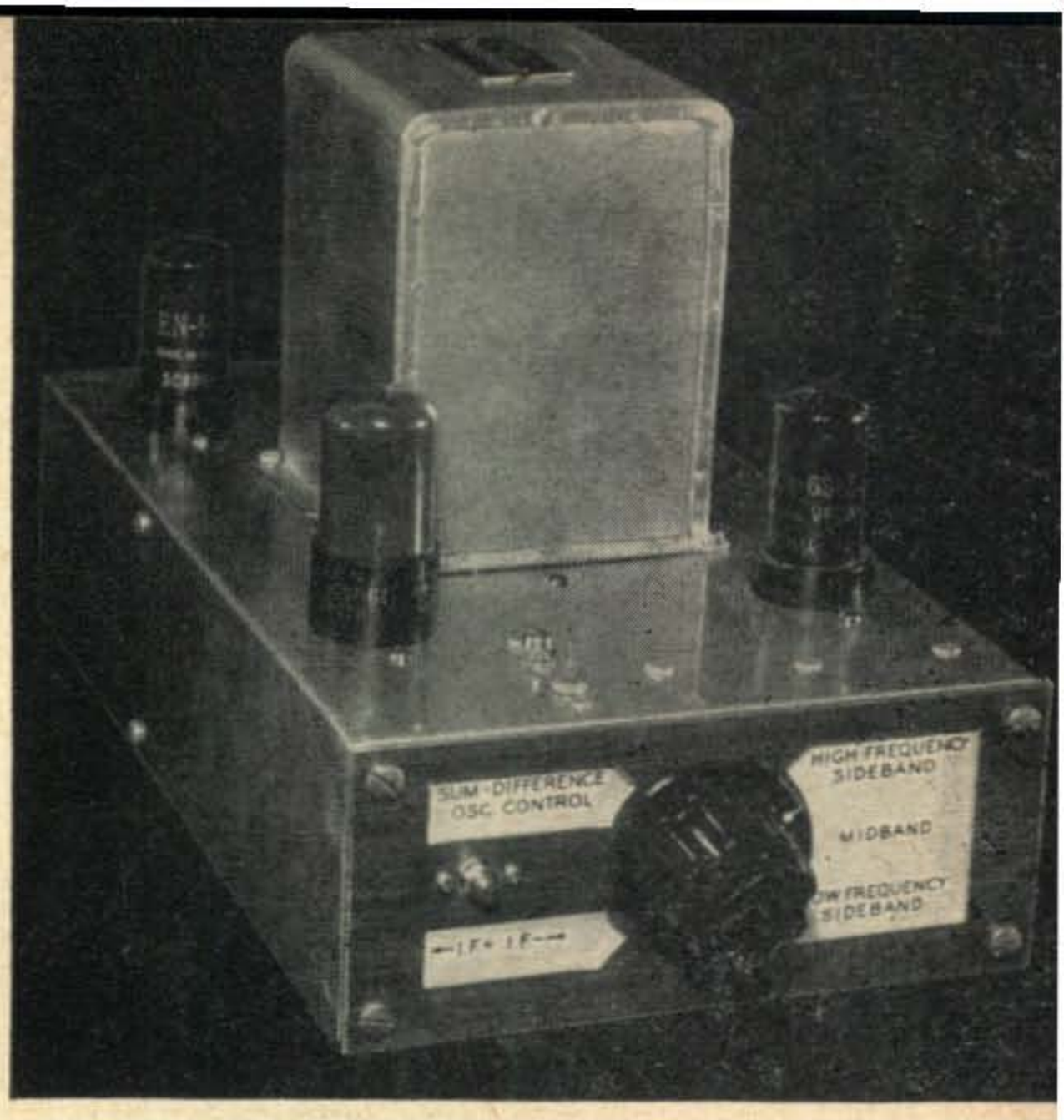
The Single-Sider makes possible perfect copy of signals that ordinarily sound hopeless under QRM. The single vernier control on the main beating oscillator sets the desired received signal anywhere within the 10-13 kc pass-band.

◆

CLAYTON F. BANE, W6WB*

◆

THE SINGLE-SIDER



Hearing is believing! And by carrying i-f selectivity to its ultimate perfection, single-sideband or extremely selective performance is achieved with startling improvement in the handling of any communications receiver. Here is an answer to QRM on phone or c.w.

IT IS THE DESIRE of the writer to emphasize at the outset that the unit to be described is suitable for the reception of FM, PM, AM and c.w., the latter two on either a single or double sideband basis. This immediate qualification is made so that no one will assume that this is a piece of equipment limited to the reception of single-sideband suppressed-carrier transmissions. This unit has several noteworthy features, among them being selectivity of a very high order, the ability to select either the high or low-frequency sideband and to provide very high rejection to the unwanted sideband. As the cumulative result of these properties, single-sideband c-w reception is possible without the use of a crystal filter "notch," while heterodyne interference on phone may be either greatly reduced or completely eliminated.

Crowded amateur band conditions have forced thinking about means of obtaining greatly increased selectivity, and there have been several noteworthy schemes presented in recent months. Most writers seem to agree that the very best method of achieving high-order selectivity is to move the i.f. to a lower frequency where high-Q circuits with decreased bandwidth are more readily possible. Still more important, however, selectivity is calculated on a percentage basis; therefore, the lower one goes in frequency the more the percentage favors. Say that a given circuit will have a constant attenuation of 15 db per octave. With this assumption, a circuit tuned to 1000 kc would provide only 15 db attenuation to a signal one octave removed (2000 kc). The same circuit tuned to 100 cycles would provide identical attenuation to a signal one octave removed or 200 cycles; a 15 db drop in 100 cycles! One can readily see that by using the very low frequencies and high-Q circuits, it will be possible to obtain response curves with very steep sides.

The Single-Sider employs an i-f channel from 10 to 13 kilocycles! A very steep-sided selectivity curve is essential but, in addition, the bandwidth at the half-power points is extremely important. Our present receivers for AM operate on a double sideband basis; therefore, the total bandwidth is twice that actually necessary for recovery of the audio signal. In other words, the carrier and only *one* of the sidebands is required. When we tune our receivers to the exact carrier frequency, one or the other of the sidebands could be lopped off and we would detect no appreciable difference in the sound of the signal. Double sideband reception forces us to twice the bandwidth permitting the i.f. to give equal response to an interfering signal located within the wide pass-band. Since the amount of noise admitted is also a function of the area under the i-f curve, we can roughly state that our signal-to-noise ratio would improve by 2:1 (6 db) if our bandwidth were reduced to half of its former value.

A very simple picture of the elimination of one sideband can be obtained by visualizing an idealized selectivity curve as shown in *Fig. 1*. The slope on the sides is perpendicular—the width across the top is just sufficient to pass the highest audio frequency sideband components essential for intelligible speech, say 3000 cycles. This then represents the minimum area that can be used in an i-f selectivity curve for intelligible reception of phone on a single-sideband basis. The top of the curve is flat; therefore, all modulating frequencies up to 3000 cycles will produce equal response. If now

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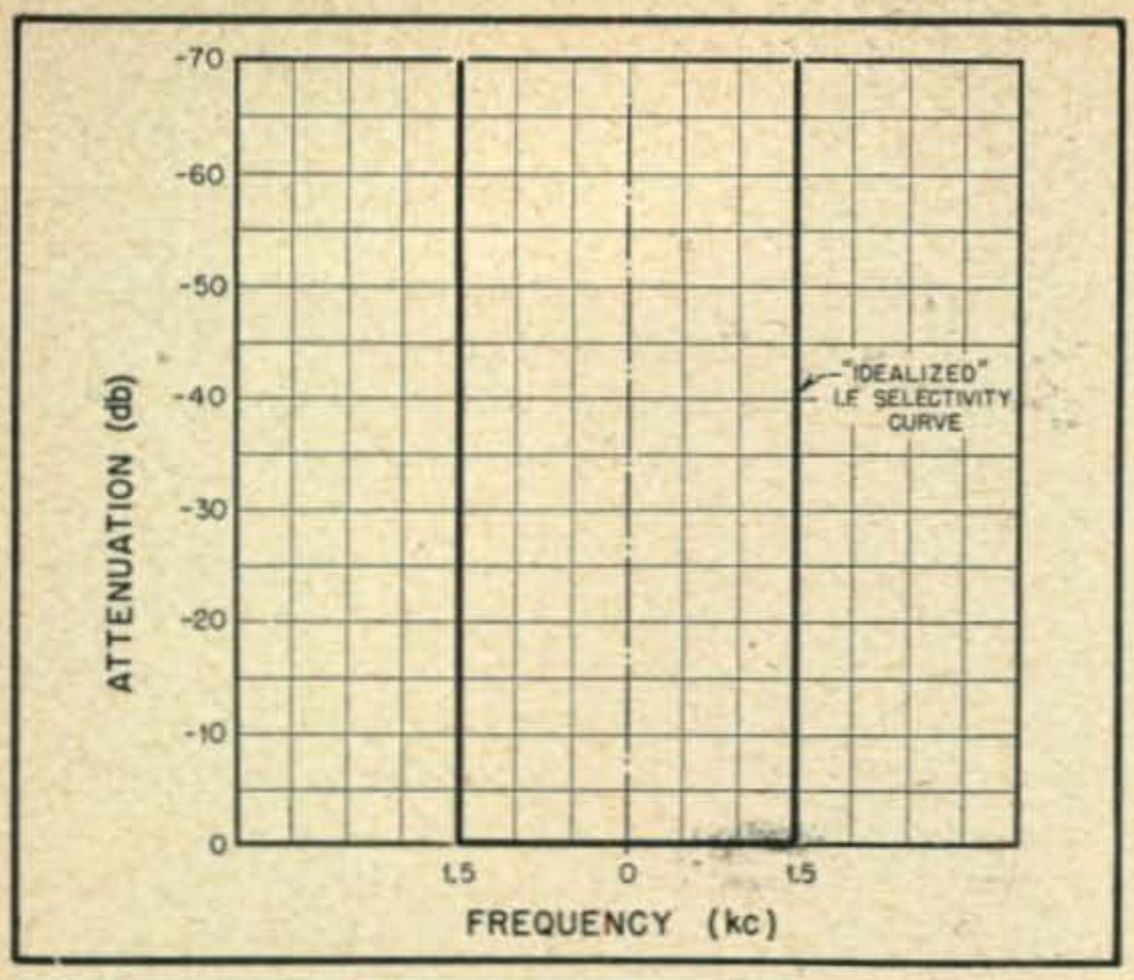


Fig. 1. An idealized i-f selectivity curve.

the carrier is placed on an exact edge of this response curve, one of the sidebands will fall within the pass-band and be reproduced, the other will fall entirely outside and will be greatly attenuated. It follows that to interchange the sidebands, it would only be necessary to shift the carrier across to the opposite edge of the pass-band. In addition to this interchange of sidebands, something much less obvious can take place. A few words of review are thus in order.

The idealized selectivity curve of *Fig. 1* has a total bandwidth across the top of 3000 cycles. If the carrier is placed exactly at either the high or low-frequency edge of the pass-band, one sideband will be suppressed and all audio frequencies up to 3000 cycles will be passed on the remaining sideband. If, however, the carrier is placed in the exact *center* of the pass-band, both high and low-frequency sidebands will be passed; the maximum audio modulating frequency to respond now being only 1500 cycles. If the carrier is placed at some intermediate position within the pass-band, one sideband will have a greater high frequency response than the other. *Figure 2* may serve to illustrate these points. It is highly significant to note that should the carrier be tuned so as to be completely outside of the pass-band, some of the higher frequencies of one sideband will still appear but without intelligence! The amplitude of the carrier must bear a definite relation to that of the sideband if the original intelligence is to be preserved; consequently, when the carrier itself is very greatly attenuated and the sideband is not, the result is "monkey chatter."

Thus if one were receiving a given signal on a single-sideband basis and an interfering signal popped up, it would be possible in most cases to tune the carrier of the latter signal outside of the i-f pass-band while still keeping the wanted signal within. Under these circumstances, the desired signal will be completely intelligible whereas the interfering signal will not, even though his chatter may be very much in evidence. The phenomenon of "monkey chatter" is like trying to receive an SSSC signal without restoring its carrier with the beat oscillator. Nothing has yet been said about heterodyne interference as such; however, if one had such an idealized selectivity curve in his i.f. and some means of readily shifting the carrier to any point in or out of the pass-band, heterodyne interference could be greatly reduced or completely eliminated. These "idealized" curves make one's mouth water but they are seldom realizable in actual practice. Here, however, is one case where this statement does not apply; there are band-pass filters available that actually come close to matching the idealized example given.

The Band-Pass Filter Takes Over

Figure 3 is drawn from measurements taken from one of the very high quality, F. W. Lynch Co., 10 to 13-kc band-pass filters. The interesting fact is that it is a factory-tuned item—has no tuning adjustments—two terminals in, two out. This doesn't mean that the filter isn't tuned—far from it. It has ten high-Q tuned circuits all precision set at the factory. Such filters are very difficult if not almost impossible to build without equipment and experience and they are costly if pur-

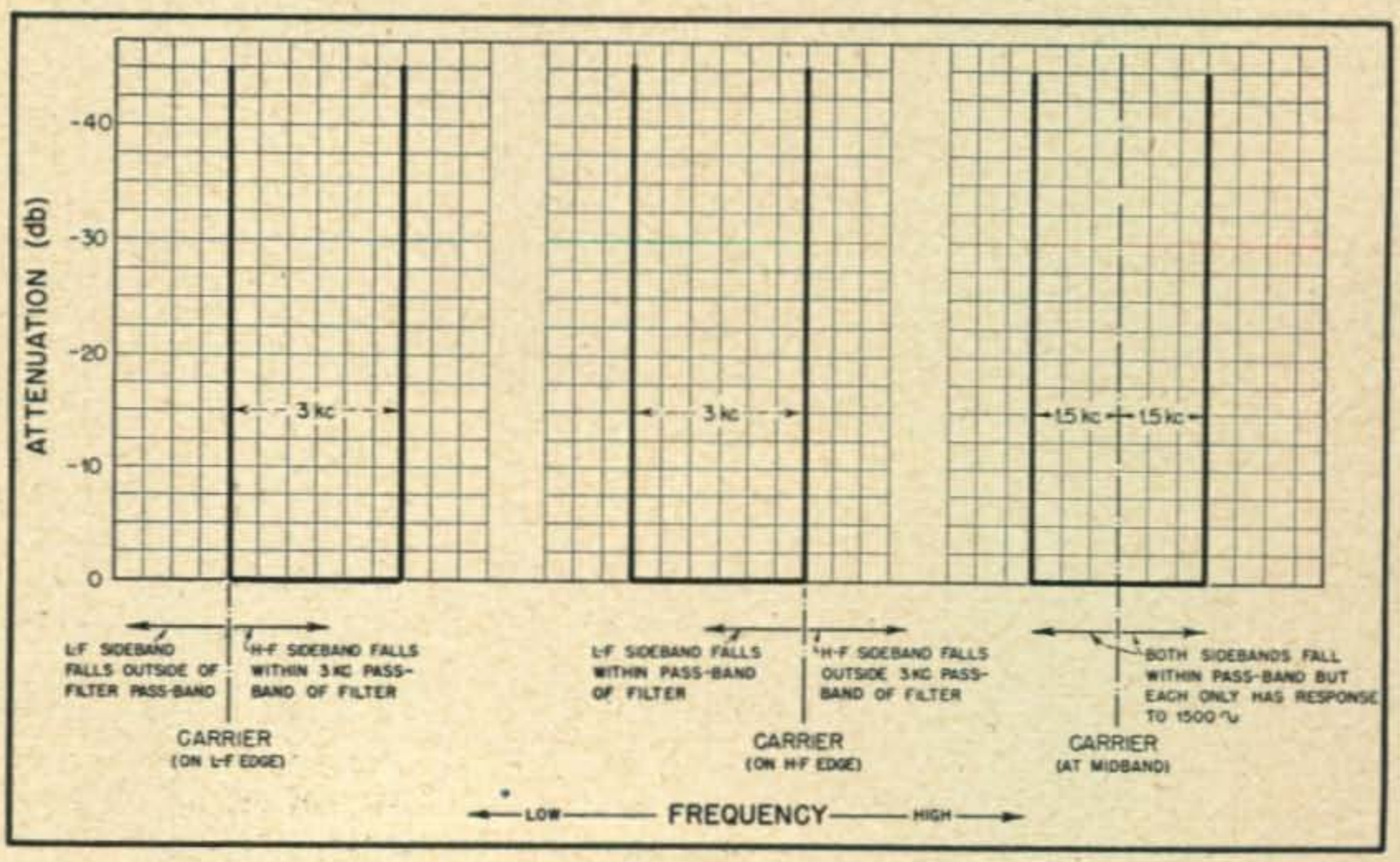


Fig. 2. Illustrating how either the l-f or h-f sideband may be eliminated by setting carrier to opposite edges of pass-band on "idealized" selectivity curves.

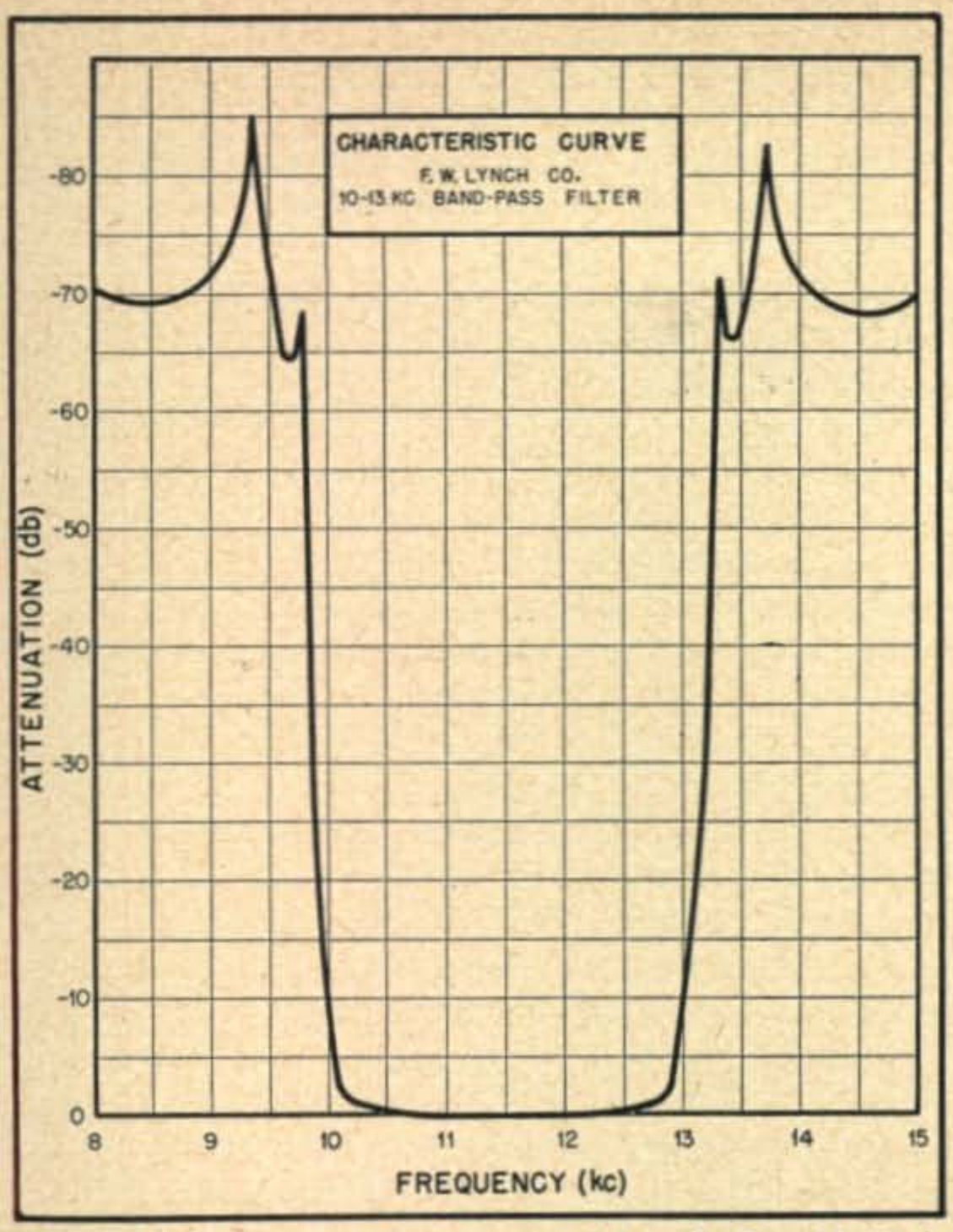


Fig. 3. Characteristic curve of Lynch Co. 10-13 kc band-pass filter.

chased. But the enormous improvement to be gained in reception on our overcrowded bands by the use of such a filter in the i.f. makes it worth while to start saving the pennies.

Just as a bit of a clincher, refer to *Fig. 4*. Here we have plotted two selectivity curves, one from a well-known communications receiver i.f. and the other from the Lynch 10-13 kc band-pass filter. Draw your own conclusions.

If any of our c-w brethren have read this far, don't leave us just yet. In the examples given we have used a bandwidth of 3 kc to permit decent phone reception but this does not mean that one cannot obtain band-pass filters with identical characteristics, but about 1000 cycles wide across the top! By the same token, c-w men shouldn't sneer at the 3-kc job. By setting the carrier to the center of the 3-kc pass-band, one can cut off all audio beat notes higher than 1500 cycles! Single-signal operation and shifting interfering signals out of the pass-band is just as feasible on c.w. as it is on phone.

The next obvious question, "How can such a gadget work with my present receiver?" is rather easy to answer. Just as one causes a high-frequency signal to beat down to the i-f frequency, so can one further beat from the i.f. down to a still lower frequency. This is exactly what is done in this instance. The band-pass filter is made up into a separate unit complete with input mixer and adjustable beating oscillator. The r-f signal at the new 10 to 13 kc i.f. is then demodulated in a copper-oxide bridge rectifier and put through an audio amplifier from which the audio output again connects to the audio stage of the existing receiver. Coupling from the receiver input to the band-pass unit is accomplished in the identical manner one would use to couple a BC-453. The circuitry throughout is extremely simple and, having already built two units (and rebuilt the first of these two about a dozen times) the writer feels that there should be little trouble in duplication. Perhaps the most helpful information will be a simple theory of operation of the completed unit working in conjunction with a standard communications receiver.

The main beating oscillator in the Single-Sider is variable. The vernier control on this oscillator is the only tuning control and it is used to set the desired signal either on the edges or anywhere within the 10-13 kc pass-band. A typical example may serve to clarify the single-sideband action: Present receiver i-f frequency is 500 kc. High-frequency signal is 14,250 kc modulated with a 3000-cycle tone so that two sidebands are produced, low frequency at 14,247 kc and high frequency at 14,253 kc. The high-frequency oscillator in the receiver will beat this signal to the 500-kc i.f. and it thus remains to beat the latter down to the 10-13 kc range of the band-pass i.f. Arbitrarily, let us set the carrier on the 10-kc edge of the filter. Our low-frequency beating oscillator must then be plus or minus 10 kc removed from the 500-kc i-f frequency. This would put the oscillator on either 490 or 510 kc. In the example given, the high-frequency sideband of the 14,250-kc signal (14,253) would then produce an i-f signal of 503 kc. The difference between 503 and 510 (the l-f oscillator) would be 7 kc and this would fall outside of the filter pass-band and not be heard. The low frequency sideband of the 14,250 signal would be at 14,247 and this would produce a first i-f frequency of 497 kc. The 497 kc beating against the l-f oscillator set at 510 would produce a difference of 13 kc which would fall within the 10-13 kc pass-band and be heard. A little thought will show that (with all other tuning remaining the same) if the l-f oscillator is shifted so as to be 3 kc higher or 513 kc, the sidebands will interchange: the high

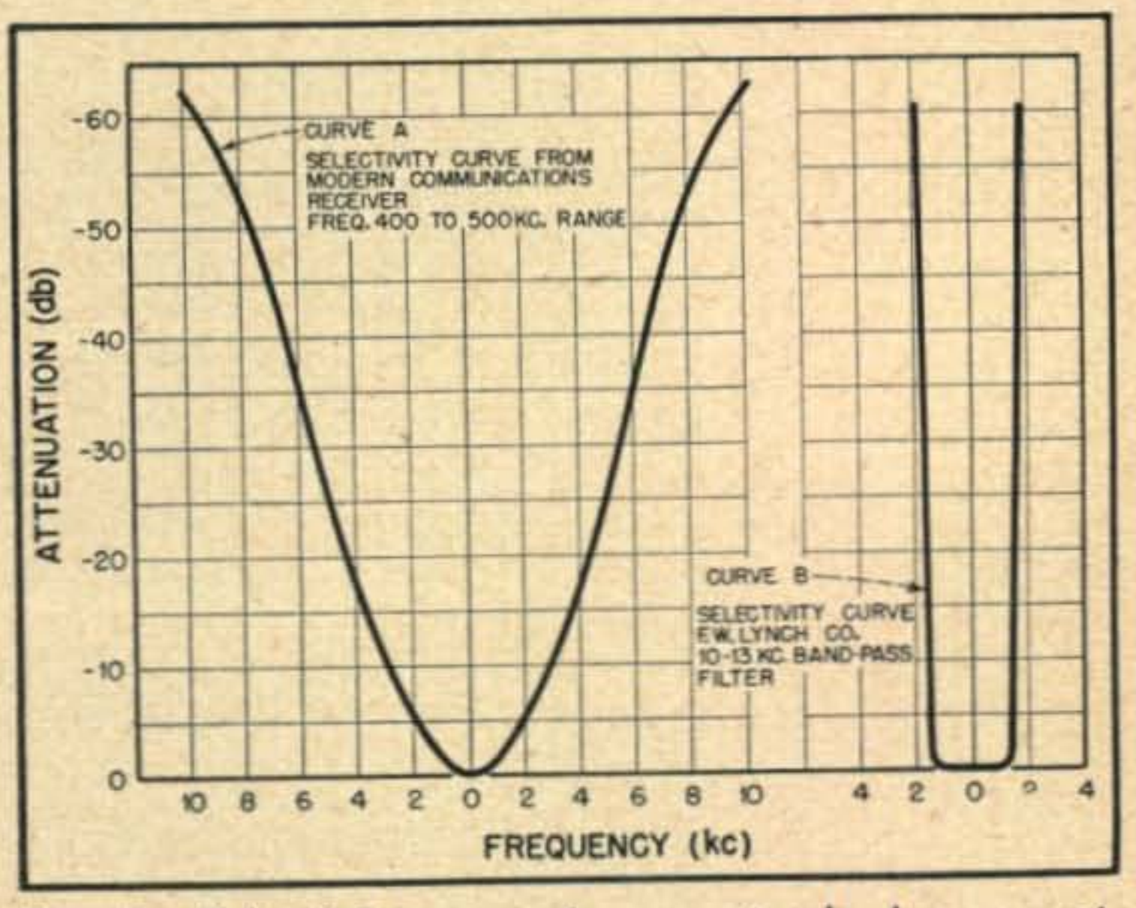


Fig. 4. Selectivity curve from a standard communications receiver as compared to selectivity obtainable through the Lynch band-pass filter.

sideband will appear within the pass-band, the low sideband outside.

One may thus select either sideband by the simple expedient of changing the 1-f beating oscillator from one edge of the pass-band to the other. As stated before, setting this oscillator to the exact center of the pass-band, one will receive *both* sidebands but with any modulating frequencies higher than 1500 cycles very greatly attenuated. Here then is the Single-Sider—selectable single-sideband with high-frequency response up to 3000 cycles or double-sideband with high-frequency response cutting sharply at 1500 cycles. A verbal explanation is necessarily involved but once the initial beating frequency is set up there will be no need to do any thinking about sum, difference et al, one merely changes the tuning of the 1-f beating oscillator to provide the best receiving conditions and the least heterodyne interference. What does it matter if you set a bit too far and thereby clip off either some of the lows or the highs? In the middle of a packed band, high-fidelity is a secondary consideration.

Design and Circuit Details

The bottom-view photograph of the Single-Sider will clearly show that some care has been taken to keep the beating oscillator off in a corner by itself. There is excellent reason for this isolation. First, because it is highly desirable to control the amount of oscillator voltage injection into the number one grid of the 6SA7. This can only be done by preventing any direct coupling into this or the main control grid (#3). Second, because oscillator leakage past the bandpass filter would be a possible cause of spurious beats. It would be excellent practice to put a complete cover on the bottom of the chassis to prevent harmonics of the 1-f oscillator from beating into the front-end of the receiver. The oscillator circuit is the familiar Clapp and while its harmonic content is very low, even a very weak harmonic can be a real annoyance in the input of a receiver with fractional microvolt sensitivity.

It is important to follow the resistor and capacity values given in both mixer and oscillator. Too much oscillator injection will increase the screen current in the 6SA7 and consequently reduce screen voltage. Plate current clipping with its attendant harmonic distortion is likewise a possibility with too much oscillator injection. Too little voltage will result in greatly decreased conversion gain. The voltage on the #1 grid can be measured with a high-resistance voltmeter in series with an r.f.c. and should be approximately two volts.

The r.f.c. in the plate lead of the mixer is a distinct "must." This plate circuit is hot with all kinds of "birdies" which must be kept out of the filter and the output system. A 5-millihenry choke is used and appears to be completely effective. (The choke is out of one of the 1-f tuning units of a BC-375, but commercial units are readily obtainable).

In the circuit diagram we have indicated the use of an F-22 band-pass filter by the National Co.

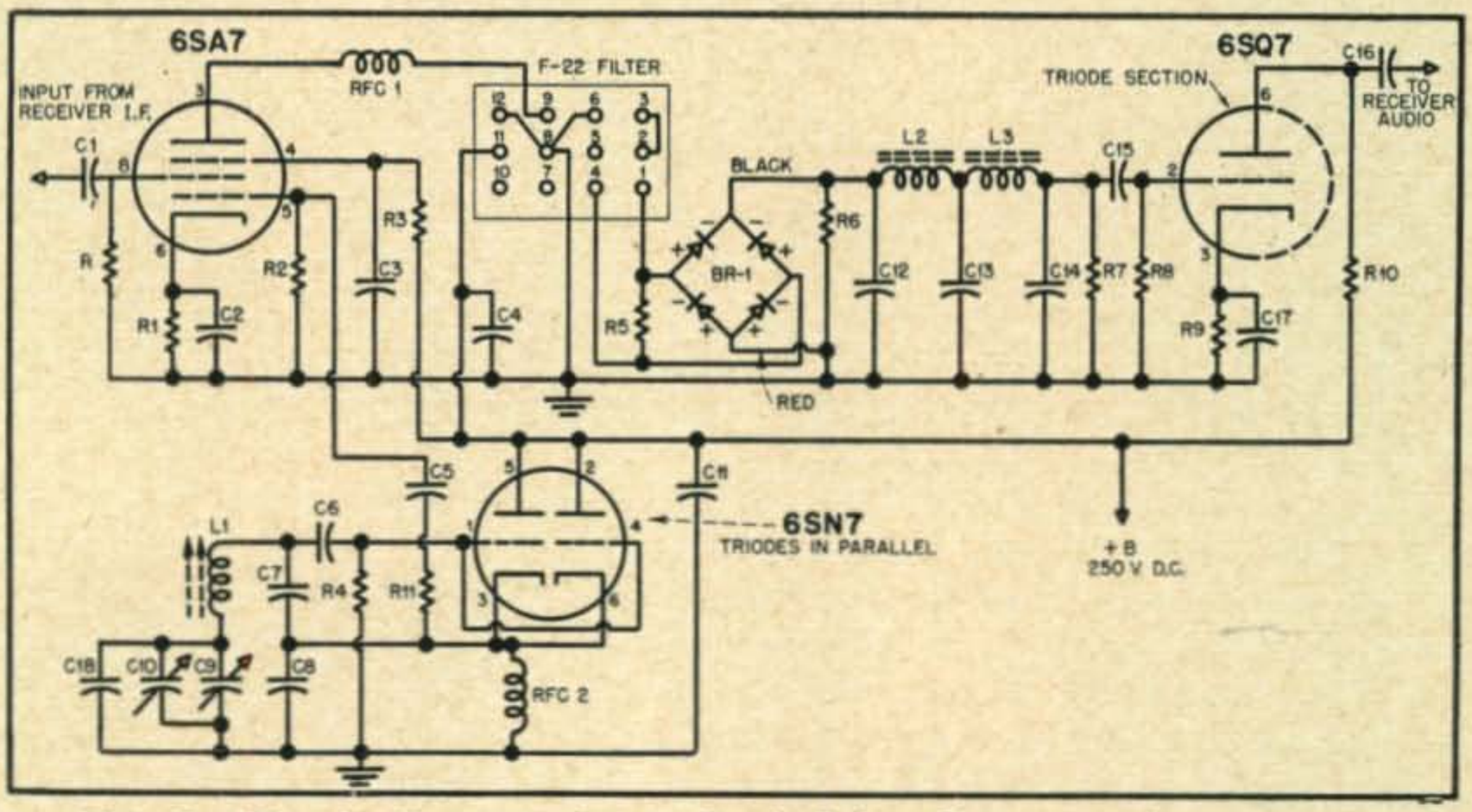


Fig. 5. Circuit diagram of the Single-Sider. Power supply is external.

C1, C5—50 $\mu\mu$f, mica, 600 v.
C2, C3, C15, C16—.01 μf, paper, 600 v.
C4, C12, C14—.05 μf, paper, 600 volts.
C6—100 $\mu\mu$f, silver mica, 400 v.
C7, C8—1500 $\mu\mu$f, silver mica, 400 v.
C9—75 $\mu\mu$f max., midget variable.
C10—3-plate midget variable.
C11—.01 μf, mica, 600 v.
C13—1 μf, paper, 600 v.
C17—2 μf, paper, 200 v.
C18—100 $\mu\mu$f, silver mica (see text).
R—500,000 ohms, 1 w., carbon.
R1—300 ohms, 1 w., carbon.
R2—10,000 ohms, 1/2 w., carbon.
R3—25,000 ohms, 2 w.
R4—33,000 ohms, 1/2 w., carbon.
R5, R6—2000 ohms, 1/2 w., carbon.
R7—100,000 ohms, 1/2 w., carbon.
R8, R10—500,000 ohms, 1/2 w., carbon.
R9—5000 ohms, 1/2 w., carbon.
R11—25,000 ohms, 1/2 w., carbon.
BR-1—Copper-oxide bridge rectifier. Conant Type B. Series 160.
L1—Litz winding from 456-kc i-f transformer. Powdered iron slug-tuned.
L2, L3—100 millihenry choke. (Low d.c. resistance—50 ohms or less).
RFC1—5 millihenry choke (see text).
RFC2—2.5 millihenry choke.
F22—10-13 kc band-pass filter (National).

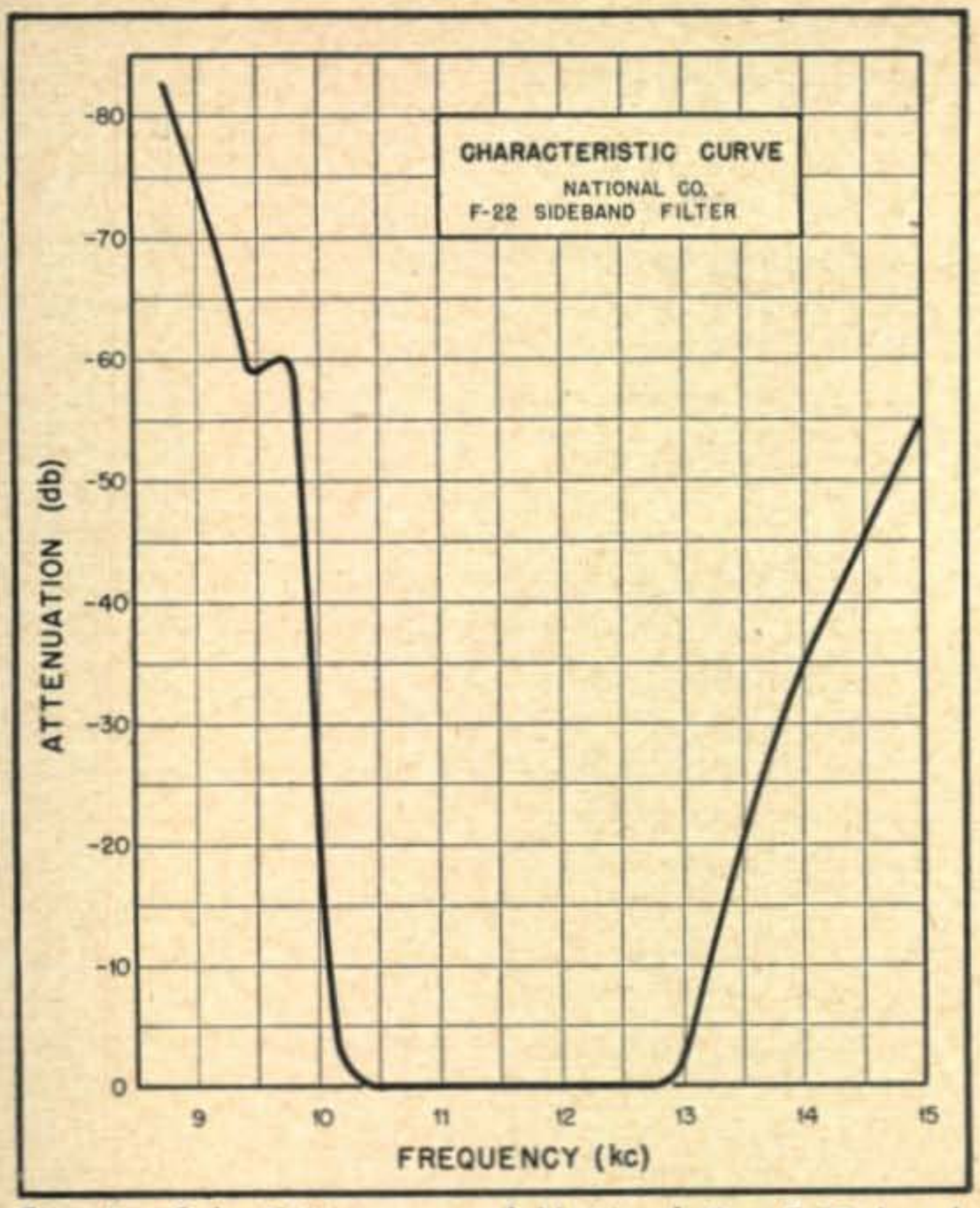


Fig. 6. Selectivity curve of National Co. F-22 band-pass filter.

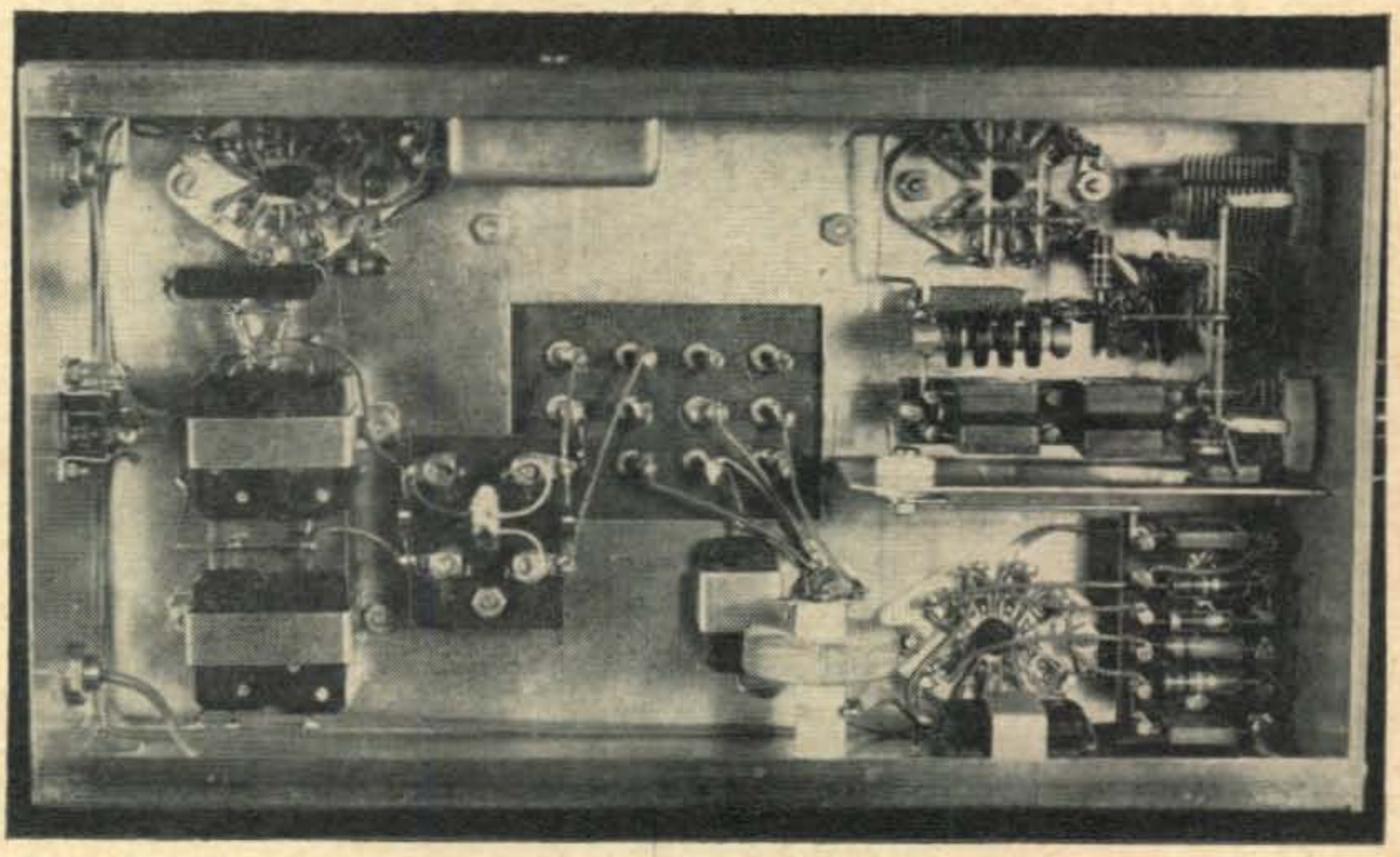
The response curve for this filter is shown in *Fig. 6*. Remember, of course, that the actual *over-all* selectivity curve is the algebraic addition of the receiver i.f., the band-pass filter, and any other backing filters that might be involved. Thus it is that in actual practice the National filter performed in a much more effective manner than the sloping-off h-f side would indicate, and the h-f sideband dropped very substantially. This National unit has some nice advantages in a unit of this type, the main one being the inclusion of built-in input and output transformers. The l-f side of this filter is, of course, terrific!

Something about the filter itself. The attenuation in these filters is relatively enormous and care must be taken to prevent any leakage through or past the filter. After all, 60 to 70 db is a long way down and the leakage doesn't have to be very great before it masks the effectiveness of the filter past cutoff points. The filter terminals are indicated on the drawing—get the grounded terminals to chassis right now! Make short, direct leads. Keep the input and output leads as far removed from each other as possible. Our mechanical layout is good in this regard (it should be after about ten rebuilds) and could well be followed exactly.

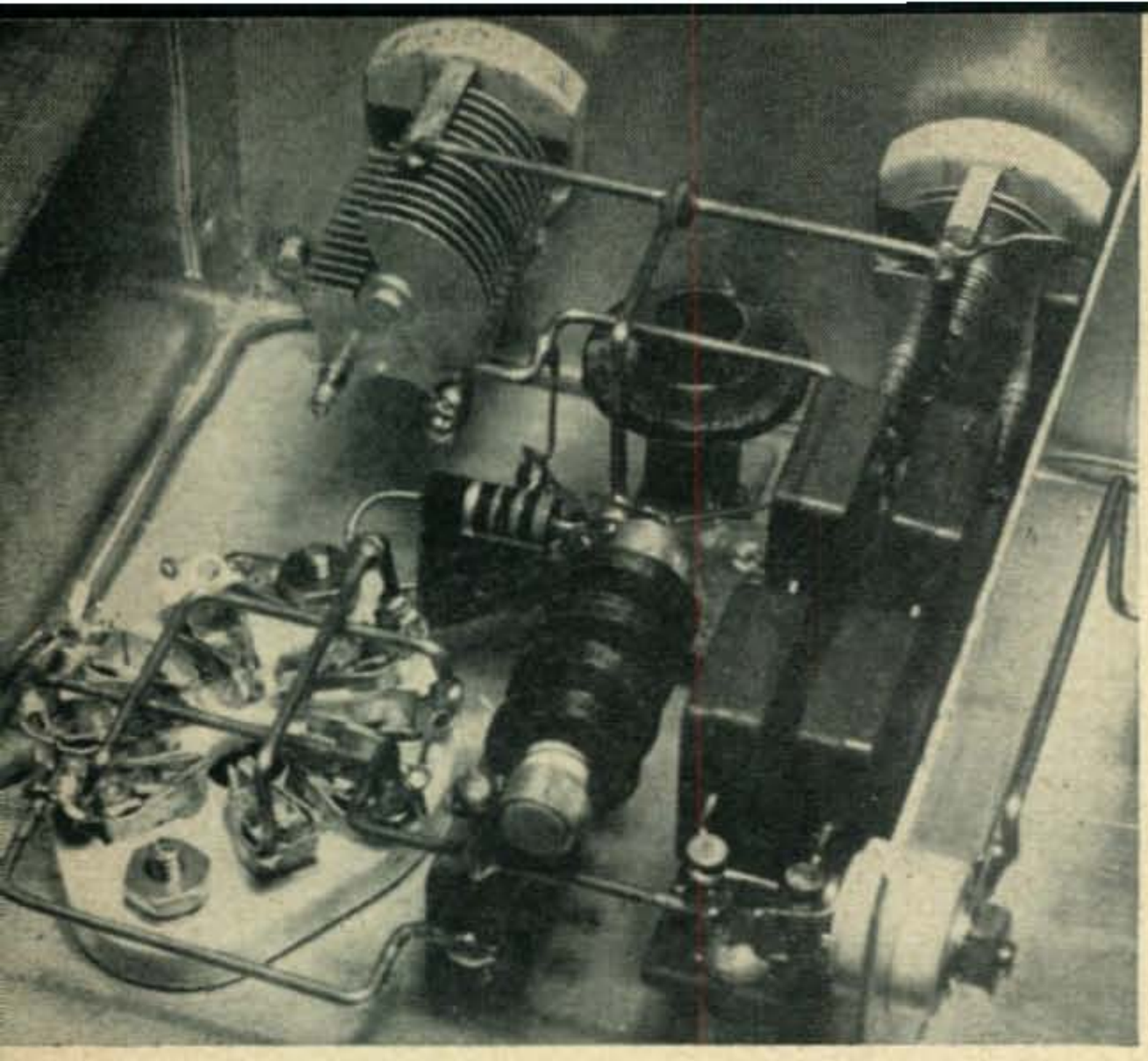
All filters are designed to work into some specific impedance, normally 600 ohms. The nice flat tops shown on the response curves are all taken with the filters properly terminated. If the filter is mismatched there will be several bobbles throughout the pass-band, a variation between maximum and minimum response of around four to six db. For amateur work a small mismatch can be tolerated. It shows up mainly as a slight variation in amplitude as a signal is tuned through the pass-band. The 2000-ohm termination resistor shown on the National filter serves to smooth out the bumps. After all, the impedance of the copper-oxide bridge rectifier varies with signal level so that it is difficult to maintain a match even though a perfect one were initially achieved. Considerable improvement in this regard can be had by keeping the input low from the receiver. This is good practice for a number of other reasons and accounts for the inclusion of the high-gain output audio stage within the unit. This stage brings the level back up to where it would be without the band-pass unit.

All filters have a varying phase shift throughout their pass-band and our filter is no exception. This subject was thoroughly treated in a previous *CQ* article[1] but sounds much more ominous than it appears in practice. There is little doubt but that a certain amount of phase shift distortion occurs in this unit but after all, the sound of the signal is the practical criterion and extensive listening has failed to dampen our enthusiasm. The

1 K. L. Kleippel, "Clipper and Filter Distortion Problems," *CQ*, Oct., 1948.



Bottom view of Single-Sider. Upper right-hand corner: Clapp oscillator. Lower right-hand corner: 6SA7 mixer. Central terminal board: F-22 filter. Lower left of filter: mounting strip for copper-oxide rectifier. Lower left-hand corner: two section low-pass filter. Coils in lower can, capacitors in top mounting brackets. Upper left-hand corner: 6SQ7 output audio. Shielded, r-f input and audio output leads come to Amphenol chassis plugs.



Close-up of low-frequency Clapp oscillator. Note the baffle partition to isolate this oscillator from the adjacent mixer. Insulator in foreground passes the coupling lead from oscillator cathode to the coupling capacitor mounted on the terminal board in the mixer section.

phone signals from this type of unit will certainly not sound the same as they will with a broad i.f., not with a 3000-cycle cutoff on the frequency range. There have been many times when it has been necessary to reduce the high frequencies to the 1500-cycle limit but the man at the other end was still perfectly readable. This unit will also definitely chew off those extra trailing-out highs that should have already been eliminated at the rig.

The copper-oxide bridge rectifier is to aid in balancing out the various beat notes which are a result of the beating between the i-f signal and the l-f oscillator as well as the main i-f frequency component. To do a commercial job, these rectifiers should be carefully matched and, additionally, balancing potentiometers included in the split legs of the rectifier. Perfectionists would likewise include a Wagener ground, a built-out bridge circuit, to snag out the last vestige of these unwanted components. In the range of this filter, 10-13 kc, we are getting up to where the responses of both the ear and the audio channels are losing effectiveness; therefore, the filtering problem is not too difficult. We use a not-too-good two-section low-pass filter between the output of the rectifier and the input of the audio to take out any spurious components that may not be balanced out in the bridge rectifier. This filter has another distinct advantage in that it greatly reduces the harmonics of these components which do not cancel in the output bridge. Such supersonic components serve to saturate the grid of the output audio stage and greatly reduce its gain. This low-pass filter also serves another very useful purpose.

When the high audio frequencies are limited to 3000 cycles, a certain loss of brilliance occurs; therefore, it is very desirable to introduce somewhere a rising audio characteristic to synthetically make up for this deficiency in highs. It is well known that a badly mismatched filter will tend to rise sharply just before the cutoff point, in this instance set to very near 3000 cycles. This characteristic, normally to be avoided, is here used to provide the desirable high frequency rise and the final result is very effective.

The 6SQ7 output audio stage is thoroughly conventional. The diodes in this tube are not used, the tube type being selected principally because of its desirable characteristics in the triode section. Alternately, cascaded 6SN7 stages might well have been used. One definite caution—make certain that the coupling capacitor to the grid of the 6SQ7 is well isolated from the rest of the circuit. Not only is this capacitor "hot" and subject to hum pickup but, far more important, is capable of spurious pickup directly from the plate of the mixer. In other words, it is possible to by-pass the band filter by direct pickup on the audio grid. Don't let the fact that this is "audio" fool you. Granting that the reactance of the leakage capacitance may be extremely high at these lower frequencies, the fact remains that one is dealing with components of very small magnitude. The attenuation of these filters past the cutoff points is so tremendous that even a very small leakage will be immediately apparent. There is no particular problem in achieving the desired result, that is if one forgets all about audio and treats the unit on an r-f shielding and isolation basis.

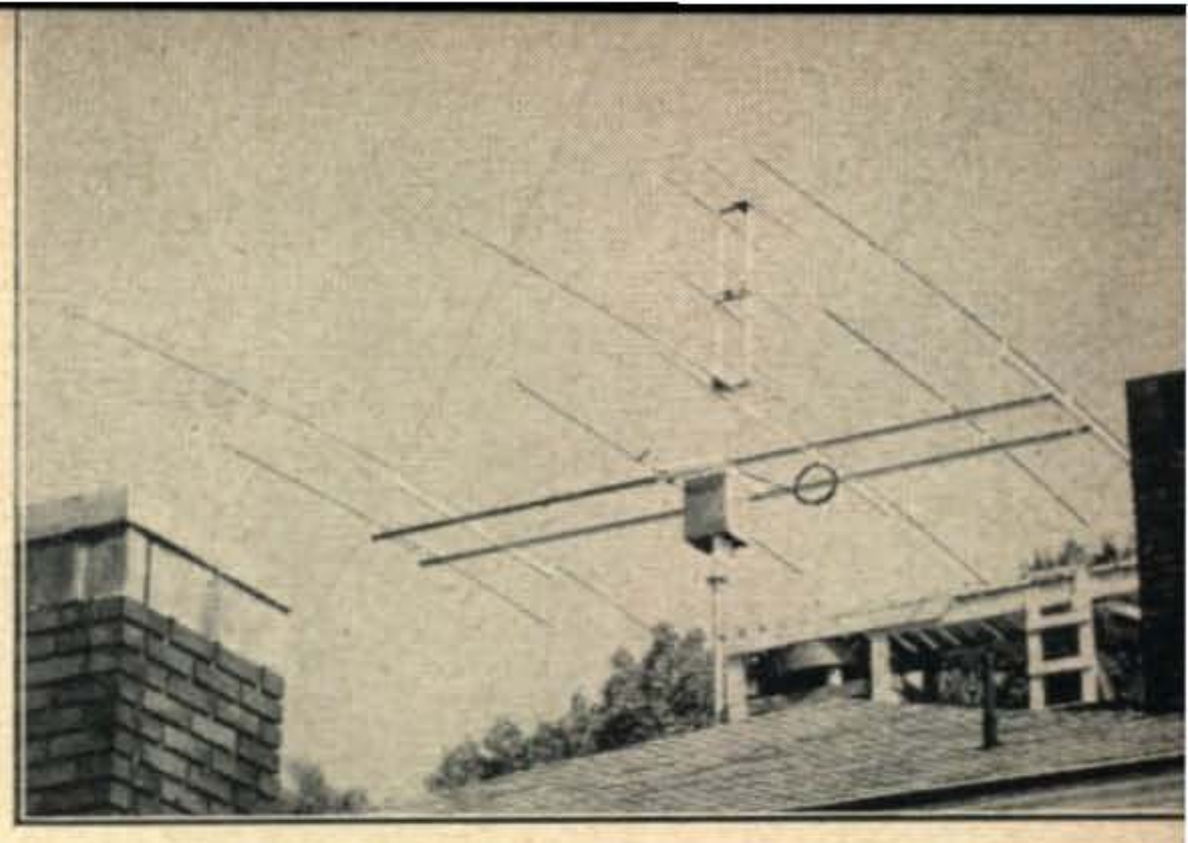
Tieing In The Single-Sider

The Single-Sider was designed to be readily added to a standard communications receiver without need for any alterations to the latter. Coupling to this unit can be obtained from the plate of the output diode in the receiver. This connection may be made to the diode pin on the tube without need for an internal connection. Conventionally, the output diode is used to supply a.v.c. for the preceding stages and in many instances also ties in with the S-meter circuit and/or noise limiter. A completely shielded lead is used on the connection between the receiver and the Single-Sider; therefore, it may be necessary to make a slight readjustment on the tuning of the diode transformer to compensate for the additional capacity so added. We have found it very desirable to completely disconnect the audio coupling condenser from the receiver diode load resistor. This is to prevent audio leakage. Remember, your receiver will still be producing a strong signal in the i.f. when you have moved this same signal out of the pass-band of the filter. Let us drive this point home by stating that the S-meter on your receiver will still be reading S9+ while you have already moved the same carrier out of the pass-band and can hear only monkey chatter. It is rather amazing to completely cut off a phone signal with the filter and then find that the same signal is perfectly readable (and capable of QRM) when the Single-Sider is by-passed.

Most communication receivers employ a small

(Continued on page 90)

The Other Fellow's Station—W4AD



W4AD, the station of Gordon L. Hight, Rome, Ga., represents the efforts of an old-timer returning to the game after a 20-year layoff.

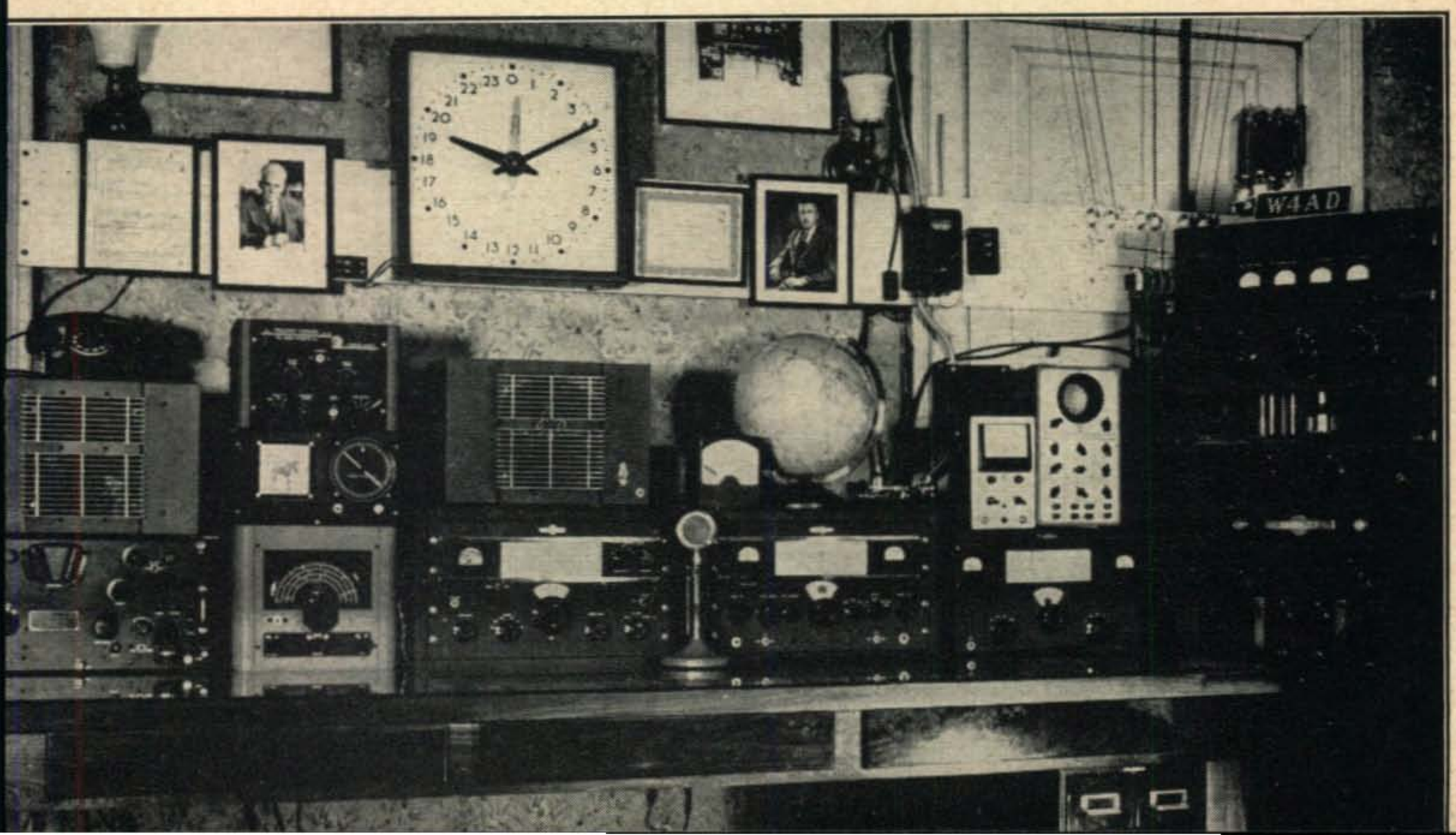
The station equipment consists of a converted surplus receiver for broadcast band reception and 10 and 20 meters through the RME HF10-20. For the other ham bands W4AD uses a Collins 75A. The world globe sitting on top of the Collins 32V-1 transmitter has been modified to place Rome at the Pole, as an aid to great circle tracking of DX. Under the voltmeter and 3" oscilloscope is the driver for the big 30K Collins.

The antennas consist of a 3-element close-spaced 20-meter beam matched to a 2" open line through a coaxial matching transformer; a 3-element quarter-wave-spaced 10-meter beam employing a T-match to another 2" open line; a 12-element quarter-wave-spaced beam for TV channel 8; and a doublet 50' high for 75 meters. At the right of the termination point of all these antennas in the shack is a dummy antenna for testing, made up of four Ohmite dummy antenna resistors.

Both ham beams are fed through two sets of slip rings contained in the housing at the center of the antenna. The combined rotaries are supported on a roller bearing and a 2" nickel steel shaft that goes down through a 2½" supporting tube into the attic. From there, through a 2" wooden shaft, the beam is connected to a quarter-horsepower motor through a reduction drive. On the bottom of the main shaft is a selsyn which drives the indicator in the shack.

The pictures partly visible high on the wall are part of the decorative scheme of the shack which consists of ten framed photos of various transmitters used at W4AD between 1905 and 1926. The lower two pictures—of Hiram Percy Maxim and K. B. Warner— were presented to Gordon after accompanying W1AW and W1EH to the International Radio Congress in Paris in 1925. The fancy clock is a war surplus 24-hour instrument with an extra hour hand to set on GMT.

Incidentally, the equipment rests on a 2" solid walnut top table. The walnut for the table was grown on W4AD's farm and was aged for 30 years. It was built by Gordon's son and presented as a gift for the OM's shack. At the bottom of the table is a six-drawer card index file containing over 6,000 identifying cards, about 5,000 Ws and 1,000 DX stations, all contacted during the past three years. The file permits immediate reference to any past contacts with pertinent facts, such as name, location, and equipment all recorded.



Cure Your TVI—Three Easy Lessons

PHILIP S. RAND, W1DBM*

Here is the nearest thing to having someone actually perform the work in your station to eliminate television interference!

A lot has been written on TVI, and rightly so, for it is undoubtedly the greatest threat of all time to amateur radio. A lot has been done by a great many amateurs in cleaning up harmonic radiation in their transmitters. In fact, if a list were compiled of those who could operate their own television receivers without interference from their own transmitters you would be surprised at the number. However, in spite of everything that has been written, said, and done, the fact remains that the average ham is waiting for it to be dished out in three easy lessons—with chocolate coating and a door prize. Well, if that's what you want, here it is: The chocolate coating is the bragging you can do on the air about how you licked your TVI; the door prize is your ability to work the rig during TV hours.

Here's the first lesson.

Lesson No. 1

Time required: 1 week.

Required home work: (1) Re-read all available TVI articles.[1] (2) Visit and make the acquaintance of, on a friendly basis, three neighbors who have television sets. (You will be graded on your diplomacy and your ability to win friends and influence people.) Make believe you know something about radio in general, if necessary.

Extra curricular activities: Shall we say liquid refreshments?

Class room work: Arrange and conduct a specific test transmission with each of your new friends to determine whether or not he can hear or, more important, see any disturbance on his TV receiver. Use both a dead carrier and a keyed or modulated carrier.

Lab. work: Keep ample notes in your notebook as to which channels he sees or hears you on, and the severity of the interference. Make sketches of what the patterns look like. This is important as it is from these tests that you will later determine what signal of yours is causing the TVI.

Examination: If you find that you do not interfere at all repeat above tests with a few other nearby TV receivers and if still no interference shows up, mark yourself 100% and go to the head of the class; otherwise continue with Lesson 2.

Lesson No. 2

Time required: 1 week.

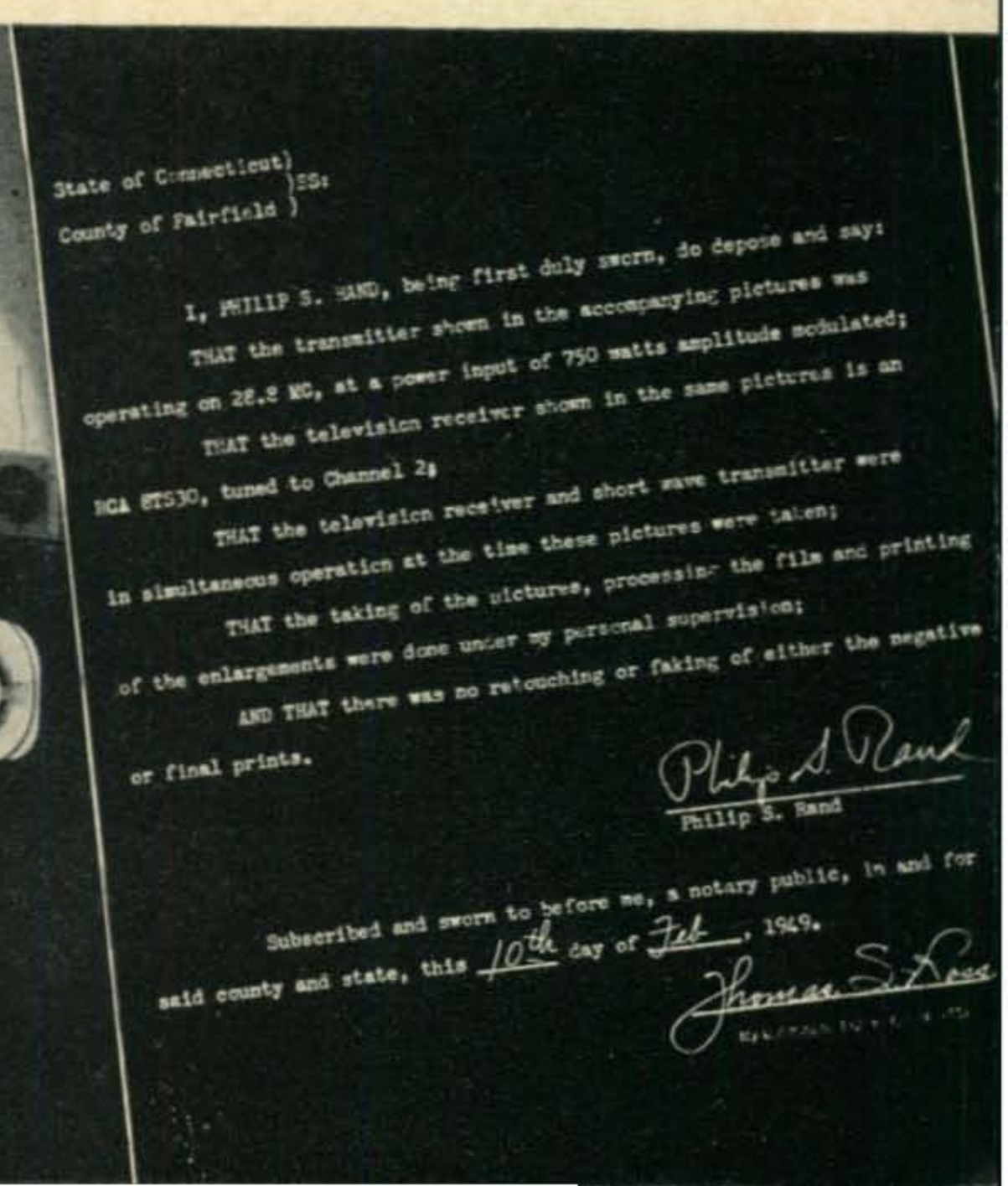
Required home work: (1) Re-read all available TVI articles. (2) Familiarize yourself with the circuit diagram of your rig, especially if it is one you bought. (3) Make mental notes on how it differs from those described in the various TVI articles.

Class room work: Arrange further tests with your three new friends. This time determine if you cause interference:

(a) When your transmitting antenna is disconnected and you have substituted in its place a dummy load of lamp bulbs. Be sure to load it up to full input.

*RFD 1, South Norwalk, Conn.

1 "Television Interference, Its Causes and Cures," Radio Magazines, Inc., New York, N.Y.



State of Connecticut)
County of Fairfield) ss:

I, PHILIP S. RAND, being first duly sworn, do depose and say:

THAT the transmitter shown in the accompanying pictures was operating on 28.8 MC, at a power input of 750 watts amplitude modulated;

THAT the television receiver shown in the same pictures is an RCA 8TS30, tuned to Channel 2;

THAT the television receiver and short wave transmitter were in simultaneous operation at the time these pictures were taken;

THAT the taking of the pictures, processing the film and printing of the enlargements were done under my personal supervision;

AND THAT there was no retouching or faking of either the negative or final prints.

Philip S. Rand
Philip S. Rand

Subscribed and sworn to before me, a notary public, in and for said county and state, this 10th day of Feb, 1949.

Thomas S. Ross

Transmitter Fundamentals	HARMONICS (mc)										
	2nd	3rd	4th	5th	6th	7th	8th	9th	10th	11th	16th
3.5 mc	7	10.5	14	17.5	**21** I.F.	**24.5** I.F.	28	31.5	35	38.5	**56** #2
7 mc	14	**21** I.F.	28	35	42	49	**56** #2	**63** #3	**70** #4	**77** #5	
14 mc	28	42	**56** #2	**70** #4	**84** #6	98	112	126	140	154	
21 mc	42	**63** #3	**84** #6	105	126	147	168	**189** #9	**210** #13	231	
28 mc	**56** #2	**84** #6	112	140	**168** #7	**196** #11	224	252	280	308	
50 mc	100	150	**200** #11	250	300	350	400	450	500	550	
	POSSIBLE INTERFERENCE TO THE NEW U-H-F TV CHANNELS										
144 mc	288	432	576	720	864						
	POSSIBLE INTERFERENCE TO THE NEW U-H-F TV CHANNELS										
220 mc	440	660	880								
	U-H-F TV CHANNELS										

TABLE I

It is possible that a harmonic generated by the transmitter which does not fall in a TV channel may beat with one of the local operating TV or FM channels in the r-f or mixer stage of the receiver and furnish a spurious signal of intermediate frequency. This spurious intermediate frequency will cause interference when a desired signal is being received. In a like manner a harmonic falling outside of the TV channels may beat with a harmonic of the local oscillator in the TV receiver and the resultant frequency may either cause interference directly or may serve as a heterodyne means to permit some other undesired signal to be heterodyned to the undesired intermediate frequency. Generally, reasonable attenuation of harmonics will provide sufficient attenuation so that these "signal image" phenomena (Philadelphia effect) will not occur.

(b) When your final amplifier is disconnected and the dummy load is connected to your buffer stage.

(c) When your buffer is disconnected and with the lamp load on your last doubler.

(d) When only your v.f.o. or exciter is running. You have, of course, kept notes in your work book on the results of *a,b,c,* and *d,* including which channels are bothered and which are not bothered, and to what extent the intensity of the interference changes as you progress from full power with the antenna on down to just your v.f.o.

Lab. work: Equipment needed: Soldering iron, screw driver, pliers, side cutters, etc.

This period is devoted to the construction of a v-h-f field-strength meter or Gimmick.[2] You may cut this class to make a trip to the local radio store to purchase one if you desire, or one may be borrowed from your radio club (they should have one for this purpose).

Note: No student can expect to pass this course without completing this laboratory period.

Extra home work: This consists of practicing with your new instrument. You must learn where to take readings and how to interpret them. You must also roughly calibrate it so you can identify your fundamental as well as the various harmonics.

2 Rand, "More on TVI Elimination," *QST*, Dec., 1948. Scherer, "The Harmonic Chaser," *CQ*, April, 1949.

Mid-Year Exam

(Any one looking at the answers before he has finished this exam will be expelled.)

1. *Question*: Compile list of possible harmonics from various amateur bands that will cause TVI if they are present, and channels on which they will fall.

Answer: See *Table 1.*

2. *Question*: Compile list of TV channel frequencies:

Answer: Channel

2	54 - 60 mc	8	180 - 186 mc
3	60 - 66 mc	9	186 - 192 mc
4	66 - 72 mc	10	192 - 198 mc
5	76 - 82 mc	11	198 - 204 mc
6	82 - 88 mc	12	204 - 210 mc
7	174 - 180 mc	13	210 - 216 mc

3. *Question*: Is it possible to cause TVI to all

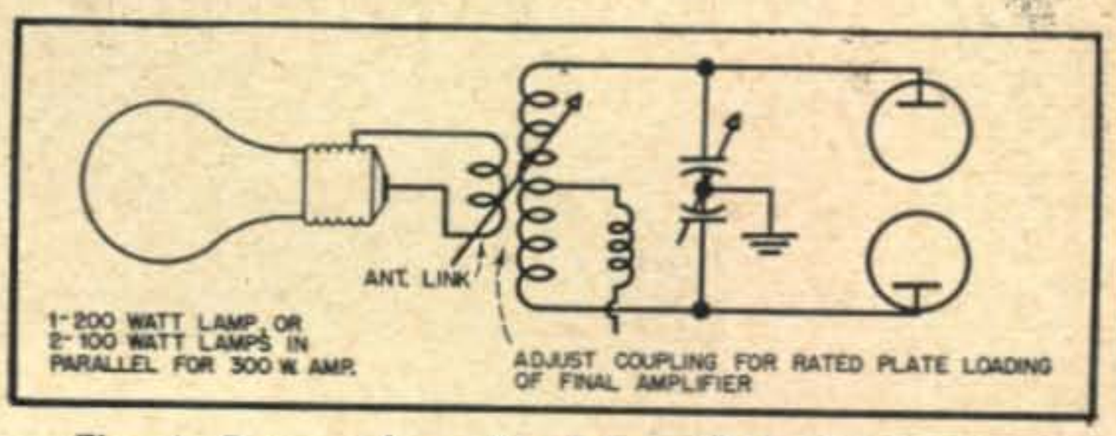


Fig. 1. Dummy lamp load for off-the-air testing.

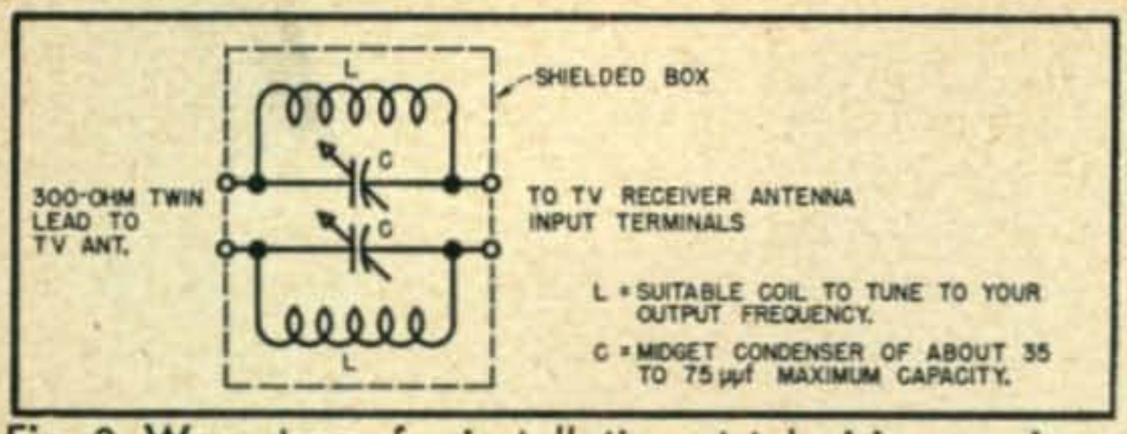


Fig. 2. Wave traps for installation at television receiver.

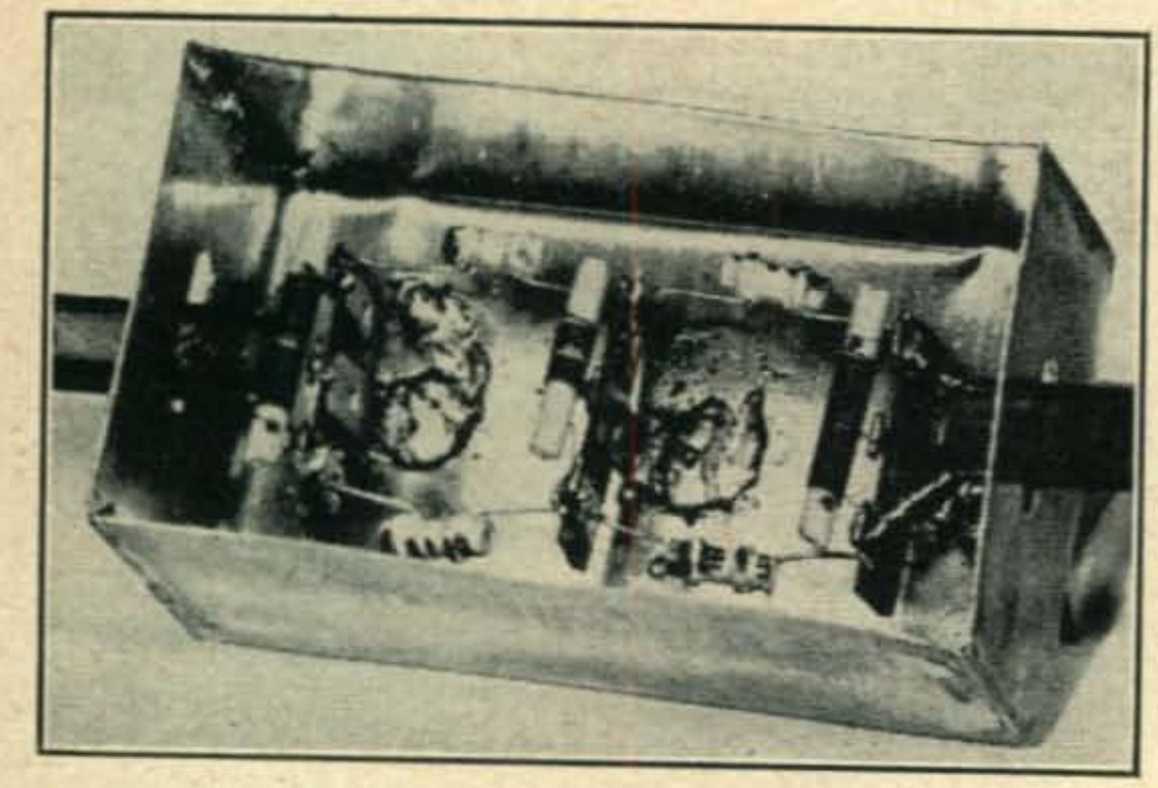
channels through no fault of the transmitter? Explain.

Answer: Yes, a strong fundamental signal located within an amateur band may overload the front end of a nearby TV receiver causing cross modulation on all TV signals, or it may generate local harmonics within the TV set itself and cause TVI. If the amateur signal is at or near the TV i-f frequency it may feed through the front end and appear on all channels. It may also be picked up by the exposed wiring in the TV set.

4. *Question*: Is it possible to eliminate this type of TVI, and where is it done?

Answer: This problem is exactly the same as any BCI problem and calls for the elimination of your fundamental signal from the TV set. This may be accomplished by connecting double wave traps in the TV set feeders tuned to your output frequency; by connecting an electrical quarter-wave length (Vp=.84) *open* ended stub of 300-ohm ribbon, cut to your operating frequency, to the antenna posts of the TV set (this stub must *not* be coiled up as this will detune it); by reducing the standing waves on your feeders and thereby reducing the r-f field in the vicinity of the TV antenna; by using a coax feeder; by running lower power to your transmitter, and by using NBFM. This problem is also helped by using a good TV booster amplifier at the TV set to get more picture signal and better adjacent channel selectivity. In stubborn cases it may be necessary to use wave traps both ahead of the TV booster and between the booster and the TV set. It may be necessary to put a bottom pan on the TV set and use an r-f line filter in the a-c cord of the TV set.

5. *Question*: If you operate several bands, what should you use at the receiver?



Method of construction and shielding of a simple, yet effective, high-pass filter used to minimize unwanted r.f. in the TV receiver.

Answer: Often times a simple high-pass filter as described will be enough to keep your fundamental out of the TV set.

6. *Question*: Who should install traps, filters, or stubs on the TV set?

Answer: If your neighbor has a service contract the TV service man should do the job as this type of TVI is a receiver fault. He may find it advantageous to install a 28-mc trap in the picture i.f. or perhaps retune an existing trap in the set to 28 mc. If there is no service contract, you can do no harm to the set by connecting an external stub, a pair of traps or a high-pass filter in the TV feeder. In the case of wave traps, they must be tuned up with your rig on the air while watching the picture.

7. *Question*: Are all TV receivers a "piece of junk," in the same class as some a.c.-d.c. midgets?

Answer: Absolutely not! Some are better than others, however, when it comes to their ability to receive a desired station through a strong local signal. How about your communications receiver? Can you receive on 28 mc with no interference when the ham across the street fires up his kilo-

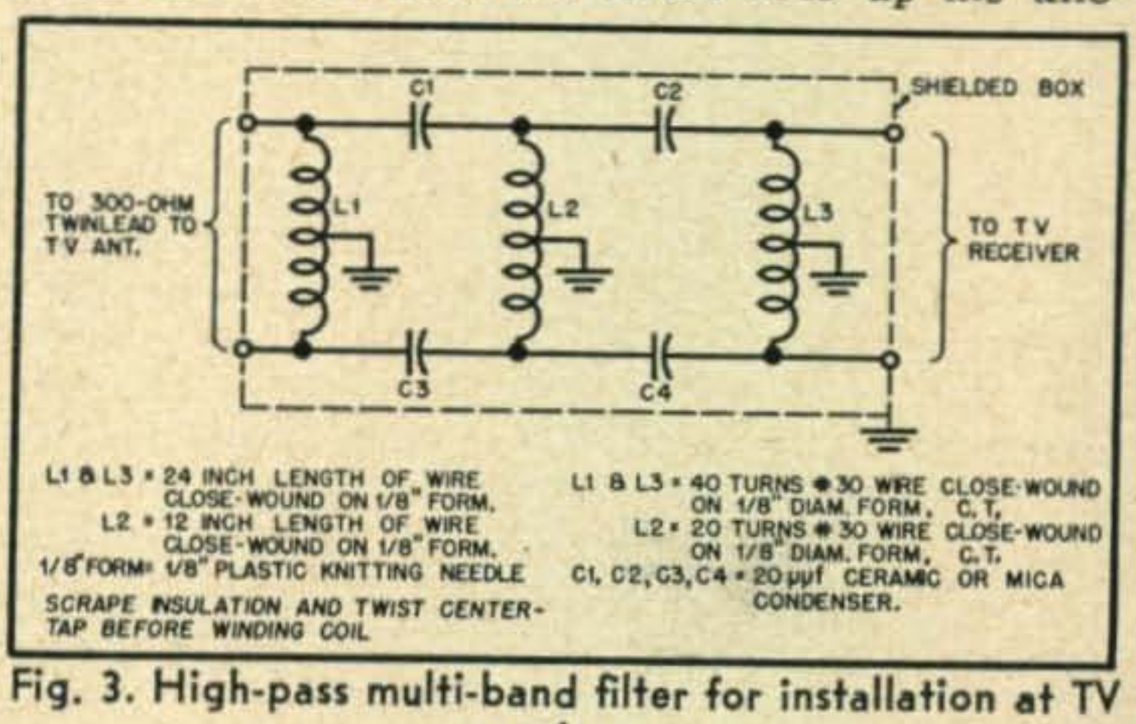


Fig. 3. High-pass multi-band filter for installation at TV receiver.

watt on 14 mc? I dare say you too have some trouble. Some of the current TV receivers on the market incorporate a high-pass filter in the input, switch r-f grid coils and provide adequate shielding and very good synchronizing circuits.

8. *Question*: Is harmonic interference the fault of the TV receiver being too broad in tuning?

Answer: No. The fault here lies at the transmitter. If the transmitter had been designed and built with the idea in mind of attenuating harmonics at their source and preventing what harmonics are left from radiating, this type of interference would not exist.

9. *Question*: Will the FCC reallocate the TV bands so that TVI will not result from amateur harmonics?

Answer: No. This would mean abandoning all the channels you have marked in an earlier question and probably some of the new proposed u-h-f channels. In other words, there would be no television left to speak of.

10. *Question*: Should you wait for some simple gadget or circuit for curing TVI to appear, or should you start right away to cure by means already published?

Answer: The latter by all means. You may be

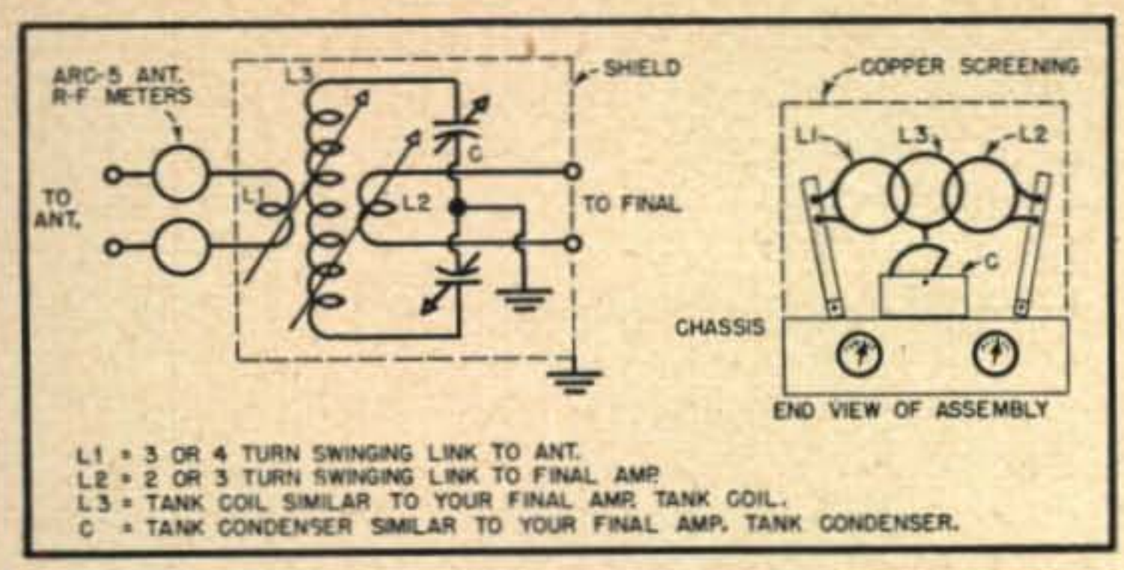


Fig. 4. Antenna coupler to provide additional harmonic attenuation. Variations of the basic circuit to suit individual layouts are illustrated.

surprised how simple a job it is, especially if you live in a primary coverage area where TV signals are strong.

11. *Question*: What factors determine the amount of TVI an amateur may cause with his harmonics?

Answer: If the harmonics land in an unused channel in your locality they probably won't cause any TVI unless they are strong enough in themselves to overload the front end of the TV set. If they land in a used channel the amount of interference is determined by the ratio of their signal strength to that of the TV signal strength and the spacing between the harmonic frequency and the picture carrier. In other words if your harmonic falls close in frequency to the picture carrier then it must be weaker by from 20 to 50 db. However, if it falls near the sound carrier it may be of equal strength to the TV signal as long as it is just separated enough so as not to be heard on the sound. The pattern you see on the screen is actually the heterodyne or beat note between your harmonic and the TV picture signal or sound carrier or both. You can minimize your TVI if you are on the borderline by selecting your operating frequency.

Let us assume for the moment that removing your antenna and substituting a dummy lamp load has eliminated all your TVI.

12. *Question*: What does this indicate?

Answer: This indicates that the TVI was being transmitted in greater part via your antenna. It most channels were being bothered previously about the same amount it indicates that it was being caused by your fundamental. If only channels upon which harmonics fell were being bothered it indicates that it was caused by harmonics radiated by your feeders or antenna. The exact harmonics can be identified by referring to the above chart and cross checking to see which harmonic would cause TVI to which channel from a rig on which band.[3] There is a possibility that a combination of fundamental plus certain harmonics is doing the job.

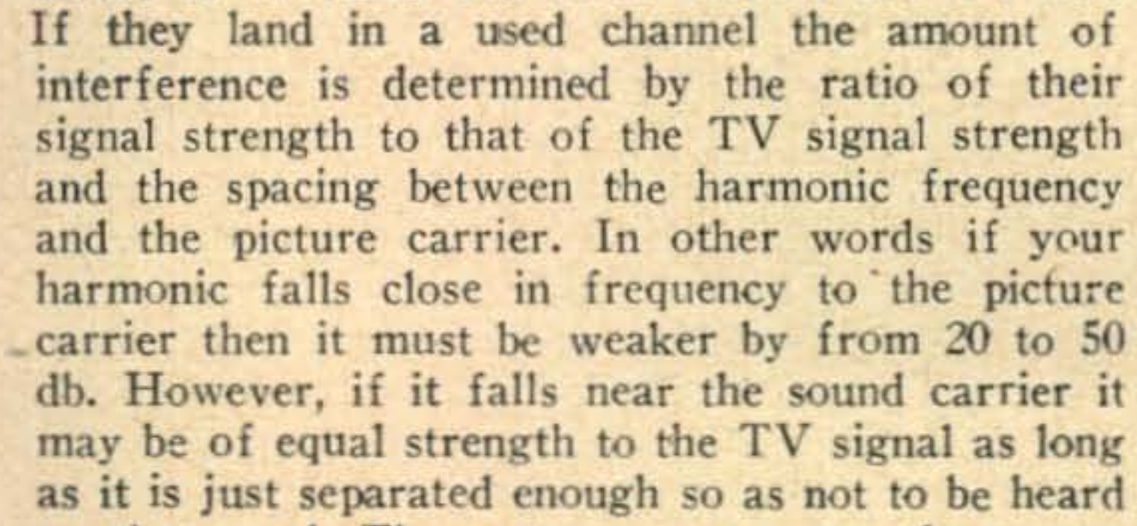


Fig. 5. A simple antenna coupler for use with low power transmitters or interstage coupling.

13. *Question*: Name the things to do first to prevent harmonics generated in the final amplifier from reaching the feeders or antenna.

Answer: 1). Ground the center of the antenna link.
2). Install a quarter wave *shorted* stub ⅛ wave from your antenna coil.
3). Install an antenna coupler between final amplifier and feeders.
4). Install a low-pass filter between antenna and final amplifier.

14. *Question*: Will such simple measures prevent TVI in an apartment house in N. Y. C.?

Answer: Yes, if your harmonics are not too great to start with and the TV sets are getting a good strong signal. In one instance a ham in N. Y. C. surrounded by 100 TV sets within 300 feet of him only had to apply the first two measures to completely clear his 500-watt NBFM rig of TVI.

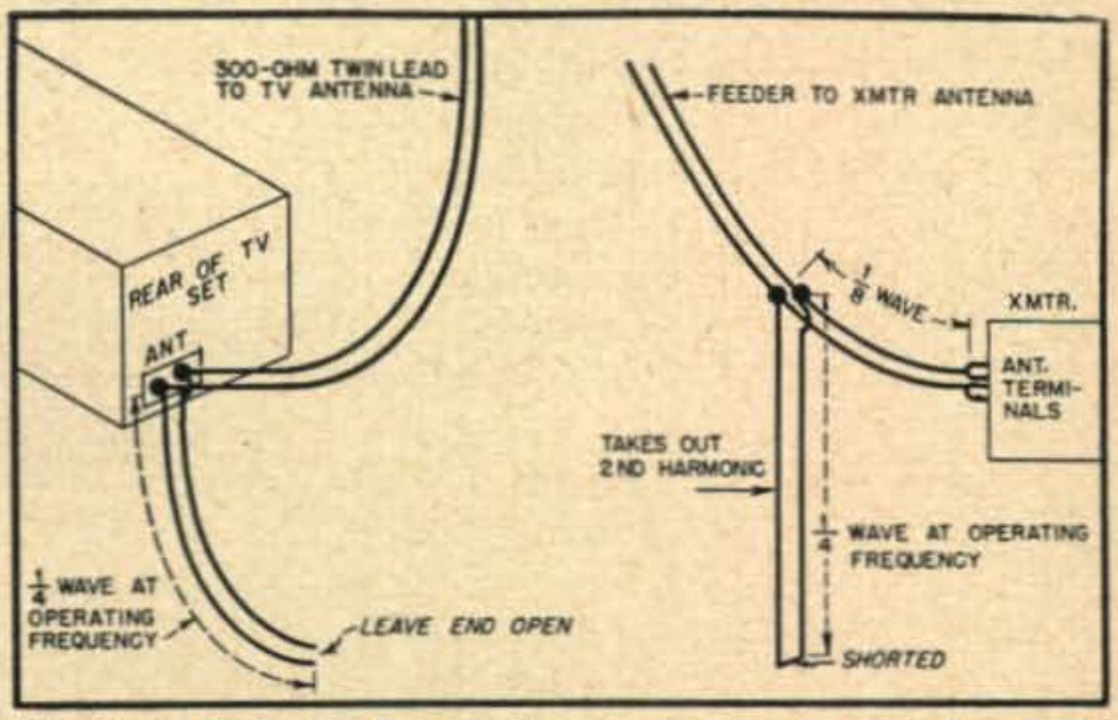


Fig. 6. Method of installing quarter-wave stub at TV receiver, and, right, at transmitter, for removal of second harmonic.

15. *Question*: Describe an antenna coupler that will attenuate harmonics.

Answer: Build a parallel tuned circuit similar to your final amplifier tank. Link couple this to your final amplifier and link couple your antenna to this. Shield the new coupler with copper screening or similar material.

16. *Question*: If a quarter-wave stub attenuates even harmonics, what should be used for the third harmonics?

Answer: A stub made up of a 1/12 wave *open* and a 1/6 wave *shorted* tied in parallel across the feeders. This amounts to a ¼ wave *shorted* stub

3 Scherer, "The Trap Box," *CQ*, March, 1949.

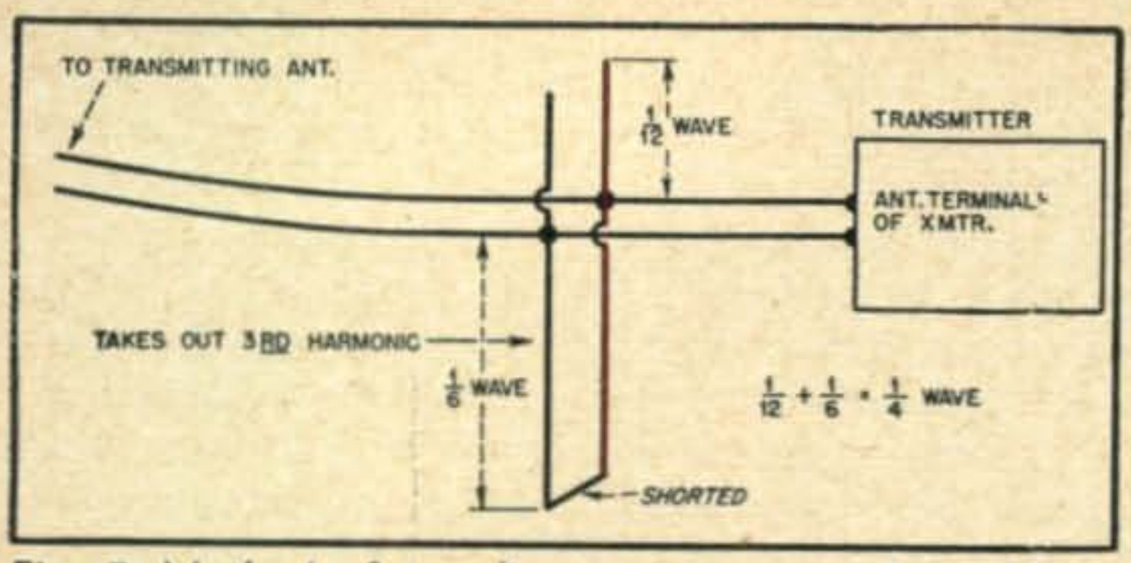


Fig. 7. Method of coupling quarter-wave shorted stub for removal of third harmonic. Placement in feedline is arbitrary.

with your feeders tapped down 1/12 wave on the stub.

17. Question: Will a stub reduce my fundamental output?

Answer: No.

18. Question: Will an antenna tuner reduce my output?

Answer: No, it may even improve it due to a better match.

19. Question: I have a nice commercially built transmitter and I don't want to dig into it as it will hurt its resale value.

Answer: Are you kidding? If it causes TVI it has no resale value except for export, or for a museum piece. However, if you clean up the TVI perhaps you could sell it for more than you paid for it.

20. Question: Supposing the installation of stubs, etc., did not clear up all the TVI, what then?

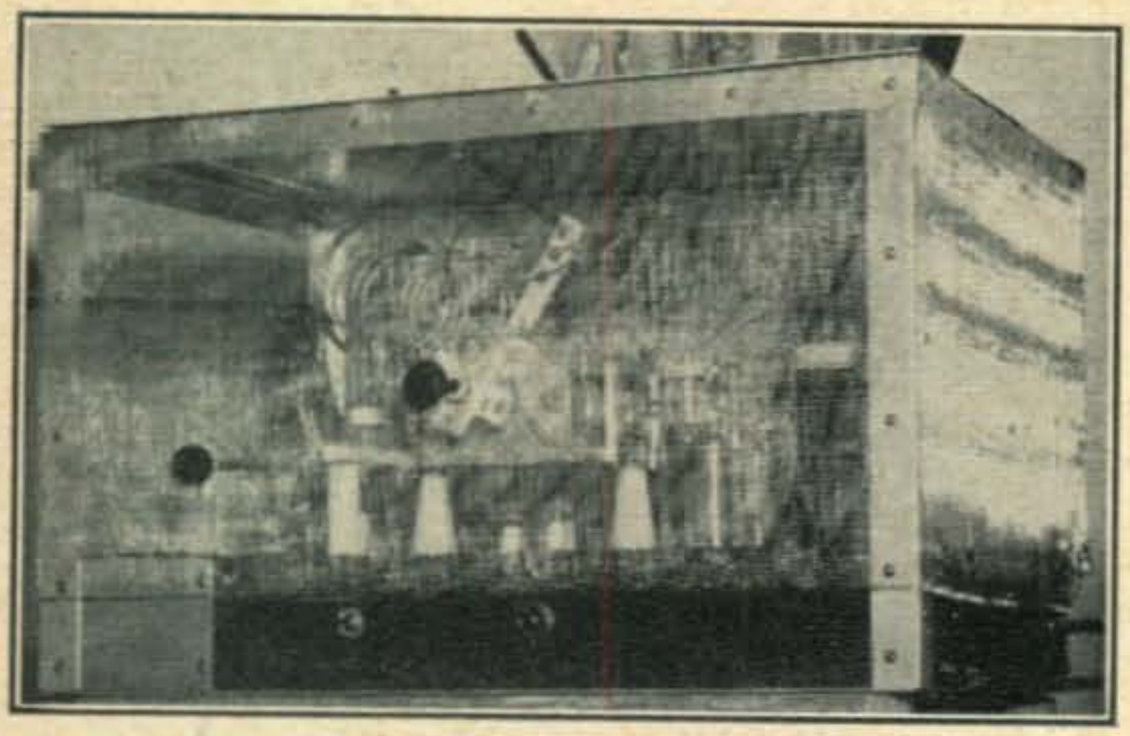
Answer: This indicates that the final amplifier has so much harmonic content that the usual means of keeping it out of the feeder are not sufficient. Therefore, means of reducing its level in the amplifier must be employed in addition to what has already been done. This will be discussed in Lesson 3.

Let us assume that the TVI was reduced only slightly when the dummy lamp load was substituted for the antenna in our first test.

21. Question: What does this indicate?

Answer: TVI resulting from this condition is almost always harmonic radiation directly from the transmitter itself and its associated components.

22. Question: How can we tell where to start working on the rig to cure this type of TVI.



Copper screen shielding which proves completely effective on a 750-watt 20-meter final amplifier.

Answer: If no TVI results when the final is turned off in the above tests, then probably the final is the only part you will have to touch. You work backward in this fashion until you come to a stage in the rig that no longer bothers. Then you proceed forward one stage at a time clearing up the TVI in each as you go until you are able to again put the antenna on. More about this later on in Lesson 3.

If you have eliminated your TVI by now, you may give yourself 100% and resign from the course.

Lesson No. 3

Time required: 1 week.

Required homework: Re-read all available TVI articles. (You should have absorbed some of the general principles of harmonic reduction by now.) Review your notebook and Lessons 1 and 2 and tabulate a list of the makes and models of the TV receivers and their distances from you to which you did cause TVI and those to which you still cause TVI. In each case list the intensity of the TVI and the channels on which it is observed. From this information you can determine from Lessons 1 and 2 just which harmonics are giving the trouble.

Classroom work: This period will be devoted to tracking down the harmonics that you have listed above.

Attach your dummy lamp load in place of your antenna and fire up the rig. At this point it is well to check up on the last payment on your life insurance policy to be sure it's in force. Remember, there are records of death from shocks of as low as 30 volts, also there are more electrocutions every year from 117 volts a.c. than any other voltage. Do not be careless! A dead ham may be one solution to TVI, but it is not recommended as the best solution! Be cautious—be sure your feet, or body, are not touching any metal object and with one hand behind your back, hold the Gimmick or Harmonic Chaser in the other and explore around the final amplifier for second harmonic, or one around 56-60 mc, as the case may be.

If you get a steady non-tunable reading when using the gimmick, do not be alarmed as this will be direct pick up of your fundamental by the two-turn link that is in series with the crystal and meter, the same as you get with a flash light loop.

This means that you must find a different place to read your harmonic such as near the tube itself, near the end plate on the tank condenser, or in the B+ power leads to that stage. It may be necessary to resort to a 4-foot piece of lamp cord with a one turn link on each end to link couple the Gimmick to the tank circuit in question. Some experimenters have found it advisable to use an 8-foot wire (half wave antenna at 56 mc) with a one-turn coil in its center as the harmonic pick-up device. The Gimmick is, of course, coupled to this one-turn loop, and the wire is so located in the room that it picks up a good signal at harmonic frequency. This requires some experimentation. The Harmonic Chaser, a far more sensitive de-

vice for harmonic measurements was described by W2AEF in the April issue of *CQ*.

At any rate, the main thing is to be able to read your harmonic output so that you can tell whether your have made it better or worse. To be on the safe side, if one is available, check with a TV set to be sure that when your meter reads less harmonic there is less TVI.

Make notes in your notebook of the readings you get on various harmonics at various places in your rig. Suggested places are as follows: near the plate tank condenser frame, near the tube, near the grid circuit, B+ lead, bias lead, 117-volt a-c leads feeding filament transformer, near the face of any milliameters in the circuit, and, of course, near your feeders. Repeat the above for each stage in your rig that you have found causes TVI.

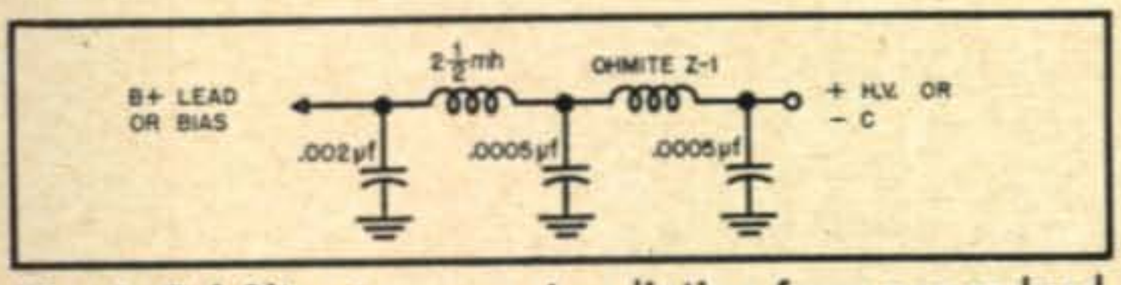


Fig. 8. R-f filter to prevent radiation from power load. The filter is suitable for under chassis mounting.

Lab. work: This period will be devoted to reducing your harmonics to a low enough value so they will not cause TVI in your particular neighborhood.

If the first experiment you perform clears your trouble, and it may, you are all done, otherwise continue step by step.

Let us assume that the final amplifier has been found to be the bad actor in Lesson 2. It doesn't matter which stage we describe, as the remedy in general is the same regardless of stage, the power, or the circuit. The only difference is the amount of work you have to do, and this is determined by how good your original design is and how strong the TV signals are in your neighborhood.

Remember, we already have our feed line to the antenna filtered for harmonics and any nearby sets trapped for fundamental if we thought this necessary. Let's assume we are on 28 mc.

Experiment 1:

Checking the final for proper operation: complete neutralization; freedom from parasitics; grid current to a moderate value; check tubes, if push pull, for balanced operation; check for 56-mc series resonance in wiring of stage with a grid dip oscillator and if found, try to break it up by rearranging leads, etc.; shorten and rearrange r-f returns to cathode, by-pass condensers, etc. The above steps may clear up your trouble without resorting to traps if you are in a good TV coverage area. Check with Harmonic Chaser to see if harmonic output has been reduced. Make notes of readings.

Experiment 2:

Installation of harmonic traps: (For mechanical details refer to the TVI literature you have been reading). There are three types of traps which can be used singly or in combination: 1) parallel tuned traps in series with the plate leads; 2) series tuned traps from plates to ground; 3) parallel tuned absorption traps coupled to the tank coil. The author has used the latter successfully, as early as 1932; however, it is believed that number one is much more effective, number two is least effective and most difficult to build, while number three is the easiest to get working as nothing has to be disturbed in the circuit.

If you are located in a strong TV signal strength area, try number three. If that doesn't completely do the job, then add number one and, if still more attenuation is needed, add number two.

It is absolutely necessary to adjust these traps while observing the strength of the harmonic. The importance of correct tuning is illustrated in the case where with correct tuning of the traps the harmonic read about 50 μv while with a slight misadjustment of the traps the harmonic read 6,680 μv.

If the completion of experiment 2 has not eliminated your TVI, you apparently live in a low signal-strength area so proceed with the next experiment.

Experiment 3:

Filtering power leads: In experiments 1 and 2 you have reduced your harmonic generation to as low a level as possible and, if you still have TVI, it is probably due to small amounts of harmonics being radiated by the various inter connecting wires between r-f amplifiers and their associated power supplies, etc. This can be checked by taking harmonic readings at various points along the cables and wiring. If you can get any reading at all, it indicates that they are carrying an excessive amount of harmonic energy, check your meters, too. It is important that these leads be filtered well if you live in a marginal TV area. The method of doing this has been described in previous articles.[4]

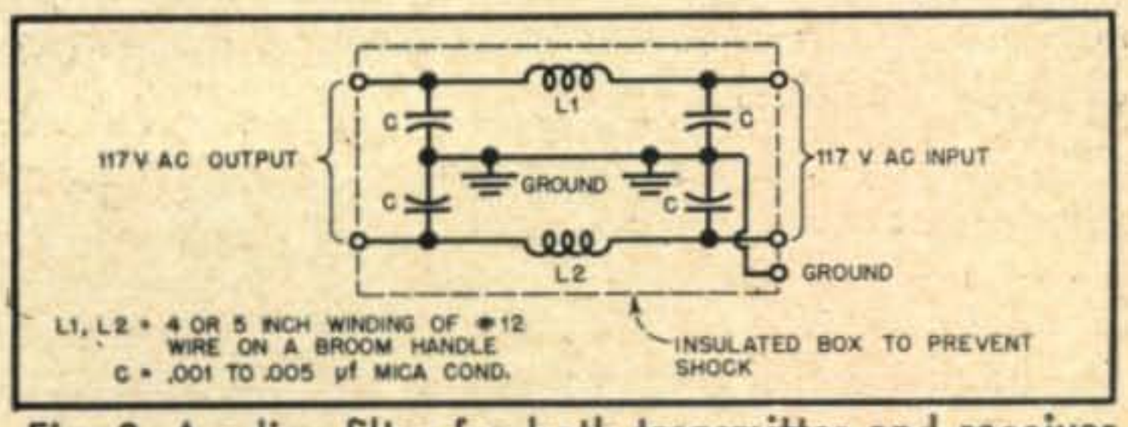


Fig. 9. A-c line filter for both transmitter and receiver.

Experiment 4:

Shielding: Good shielding is important in areas of high TV signal strength as well as in areas of low signal strength. Two poor jobs of shielding, one within the other are better than one good job of shielding. In other words, an r-f chassis, casually shielded with copper screening, and placed in an enclosed relay rack, is excellent.

Summary

Remember there are four principal types of TVI:

1) BCI type—your fundamental overloads TV sets.
2) Harmonic type.
3) Spurious emissions—key clicks, side band, splatter and parasitics.
4) A combination of 1, 2 and 3.

(Continued on page 84)

4 Rand, "TVI Can Be Reduced," *QST*, May, 1948.

The BC-375E Strips for Action

JIM KIRK, W6DEG*

An extraordinary bargain, the much maligned BC-375E makes an excellent all-band transmitter if properly handled. This is the first of several simple conversions using as much of the original rig as practicable.

THE RADIO AMATEUR purchasing the BC-375E or the BC-191F quickly realizes that he has a transmitter strictly not of "modern design." Those adventurous souls who have put them on the air "as is" using either a dynamotor or power pack, should have received the familiar pink ticket in short order. To balance the inherent weaknesses of design, according to present day standards, is the low initial purchase price, the solid construction and the clean-cut physical appearance.

Naturally, the cost can be partially recovered by stripping the entire unit for component parts. A somewhat better idea, I have found, is to rewire the circuits, using as many of the original components as possible, while adding a little more surplus material. Specifically, I have removed most of the original circuitry, built and wired a low-voltage power supply into and behind the tube compartment, while re-designing each of the tuning drawers to cover one amateur band. The drawers are individual transmitters, consisting of the surplus tube combinations, 6L6 oscillator/ amplifier and 826 final amplifier. With minor changes the antenna loading and tuning unit remains completely useful.

The Partial Dismantling

The second realization about these transmitters came when we found it necessary to use brute force with cold chisel and hacksaw to remove some of the well-anchored parts. However, this is not as bad as it sounds and with a little care exercised here and there, most of the parts can be used again.

First step is take off the back panel, slip out the tuning drawer, and remove all the wiring in the main body of the transmitter associated with the original circuit. Leave the wiring in the antenna tuning and loading compartment, although the antenna relay must be removed and the circuit slightly altered, as shown in the lower right corner of *Fig. 1*. For the sake of appearances, it might be best not to remove any of the controls from the front panel. Switches and meters will be used.

Dismantle the drawers, one for each band, by taking off the top and bottom plates and stripping out all the original wiring. Leave in each drawer the variable condenser marked "B." Remove the switch labelled "Ant. Coupling Switch D." The hole that this will leave in the panel serves as a spot to reach the neutralizing condenser with a long shank screwdriver.

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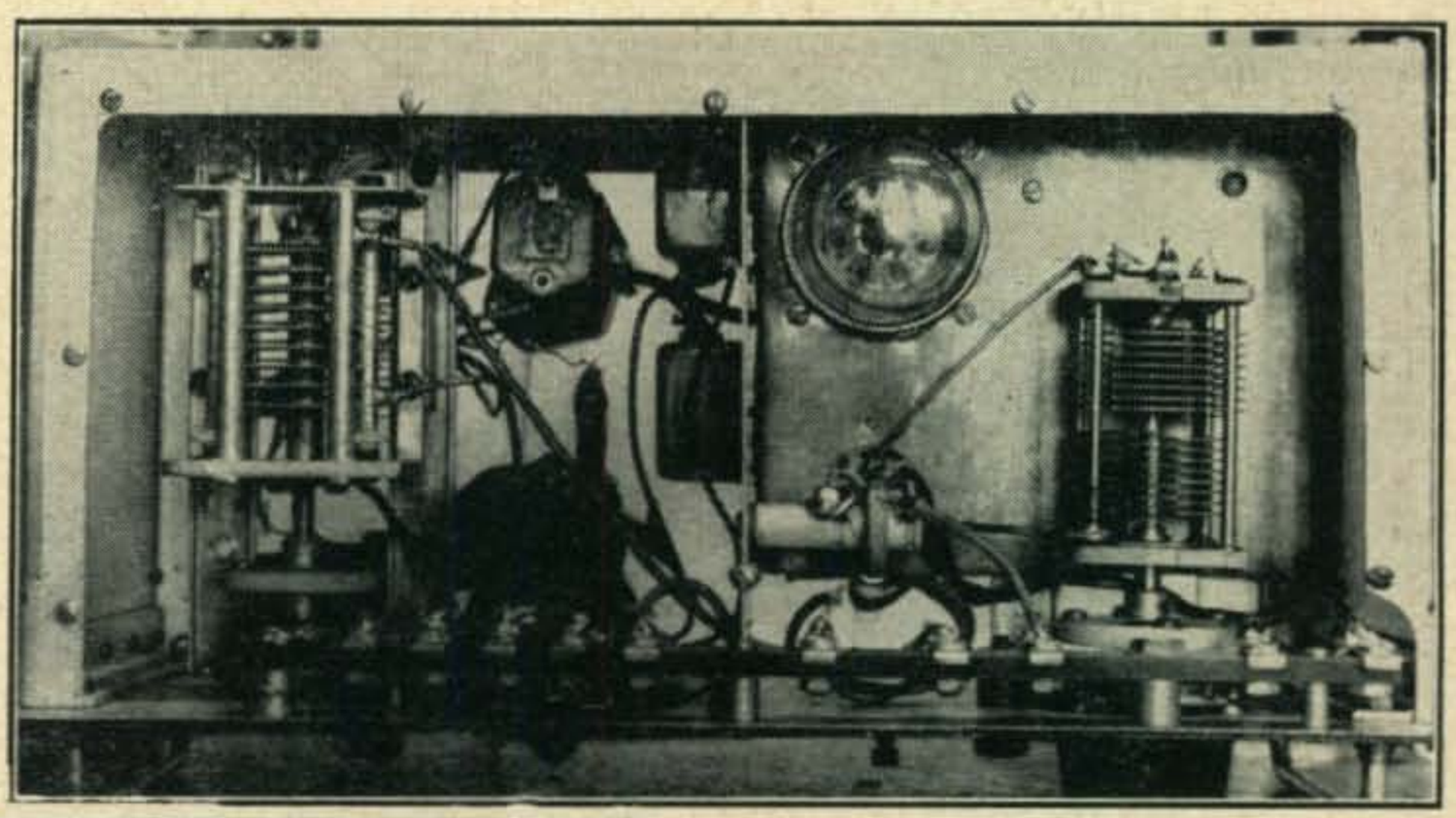
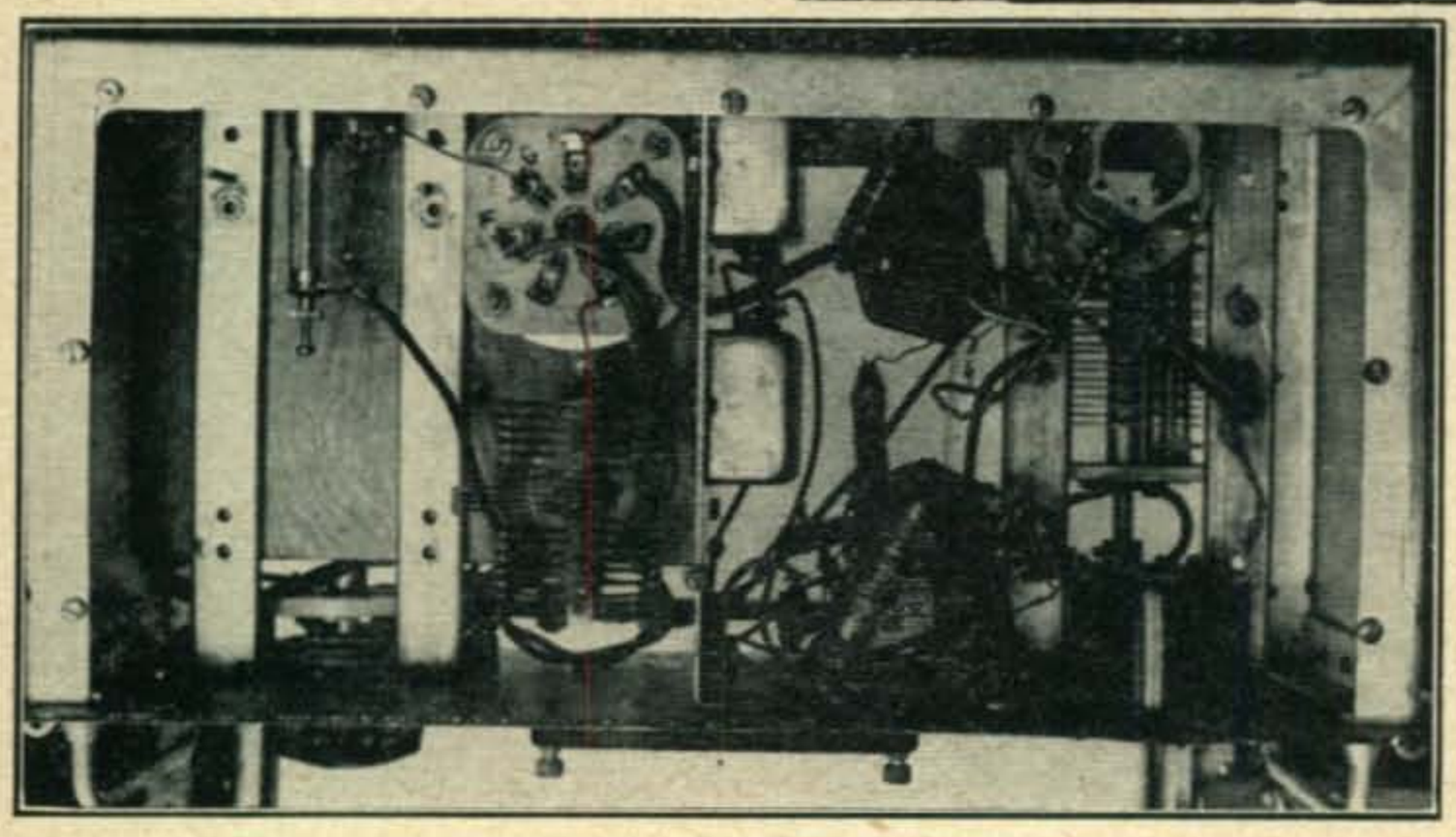




Above: Top view of the 20-meter drawer. The base mounting brackets of the dual 100-$\mu\mu$f condenser determine the level of the copper sheet holding the 826 and plug-in coil sockets. Plug-in coils are used.

◆

Left: Bottom view of the 20-meter drawer. The Millen neutralizing condenser can be seen in the lower right corner. It is directly opposite the hole in the panel left by removing switch "D". The 6L6 plate coil is taken from a GF-12 transmitter. The bathtub condensers are part of the key click filter.

Reconstruction

The low voltage plate supply for the 6L6 may be conveniently built into the vacated tube compartment of the transmitter frame. Any of the usual power supplies will do if they provide 300 volts at about 100-150 ma. The schematic in *Fig. 1* uses some old junk box parts and is shown merely to designate the socket connections to be made to the drawers and the power supply switching arrangements. The a-c line is well-filtered with inductances and condensers obtained from the surplus market. The high voltage supply for the final amplifier should be external. It is brought into the transmitter through a heavy-duty coax cable and the four-prong socket at the back.

A 45-volt battery is used for fixed bias on the 826 final amplifier. This may be mounted in the transmitter. It is connected between *pins 2* and *3* with the plus side going to *pin 2*. A connection from *pin 1* is brought out to a coax connector on the front panel. This provides a means of coupling the output of a v.f.o. directly into the grid of the 6L6.

In the antenna compartment, the inductance switch "P" is removed and a tuning condenser *C11* is mounted in its place. This condenser may be switched into the "counterpoise" side of the antenna tuner by switch *SW3*. The original antenna current meter will probably read too low, and to obtain more sensitivity it may be substituted with a meter from a GF 12 surplus unit. It will look approximately the same and with a little filing will fit the hole. The antenna inductance "M" is connected as shown in *Fig. 1* and is used for harmonic suppression. Tests show that it will easily improve harmonic attenuation appreciably.

Except for coil size, all drawers were constructed alike. The surplus twin-variable condenser, *C8*, should have mounting brackets. These will determine the level of the plywood backed copper sheet which is used for the mounting of the 826 tube

(Continued on page 85)

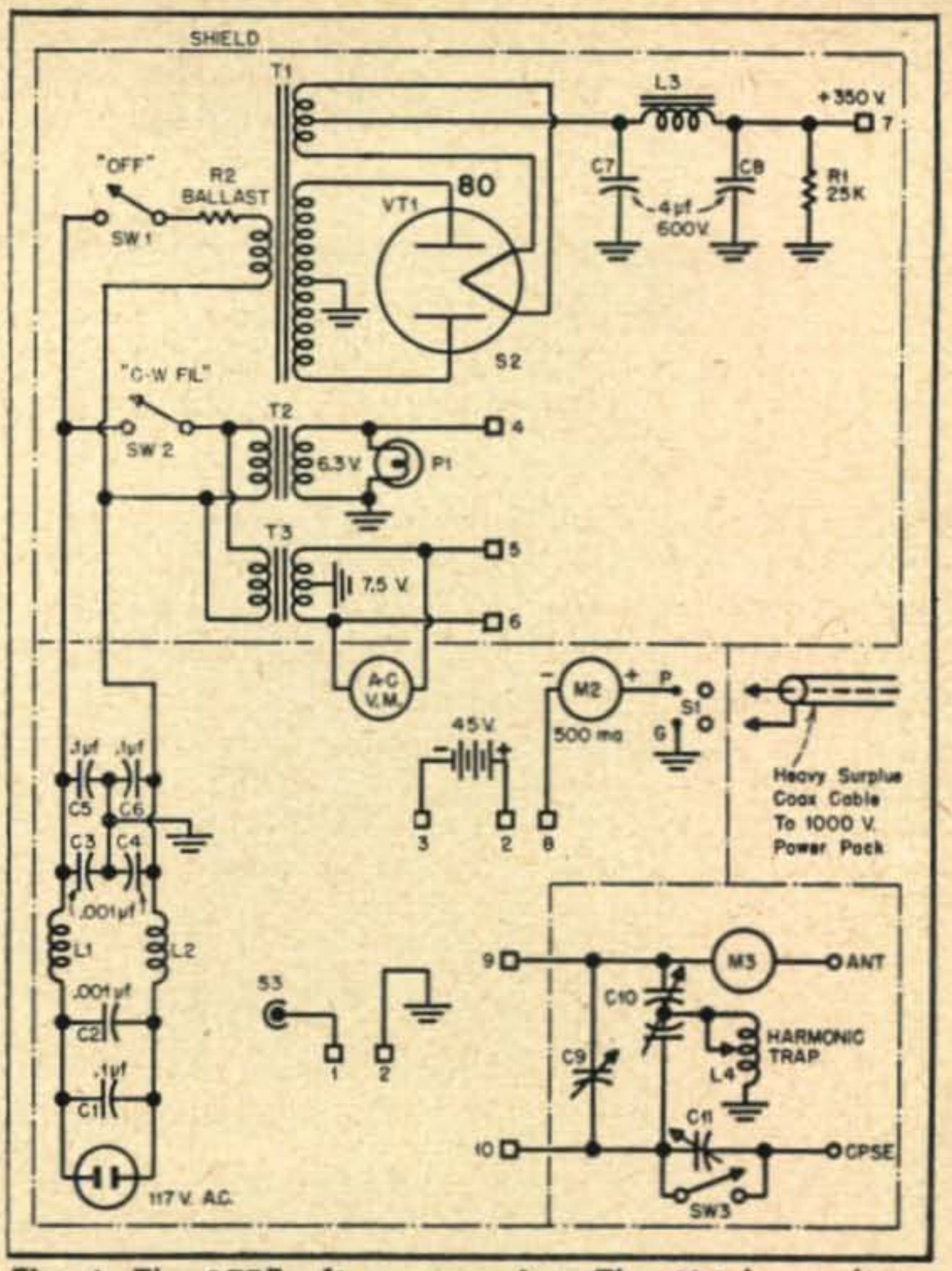
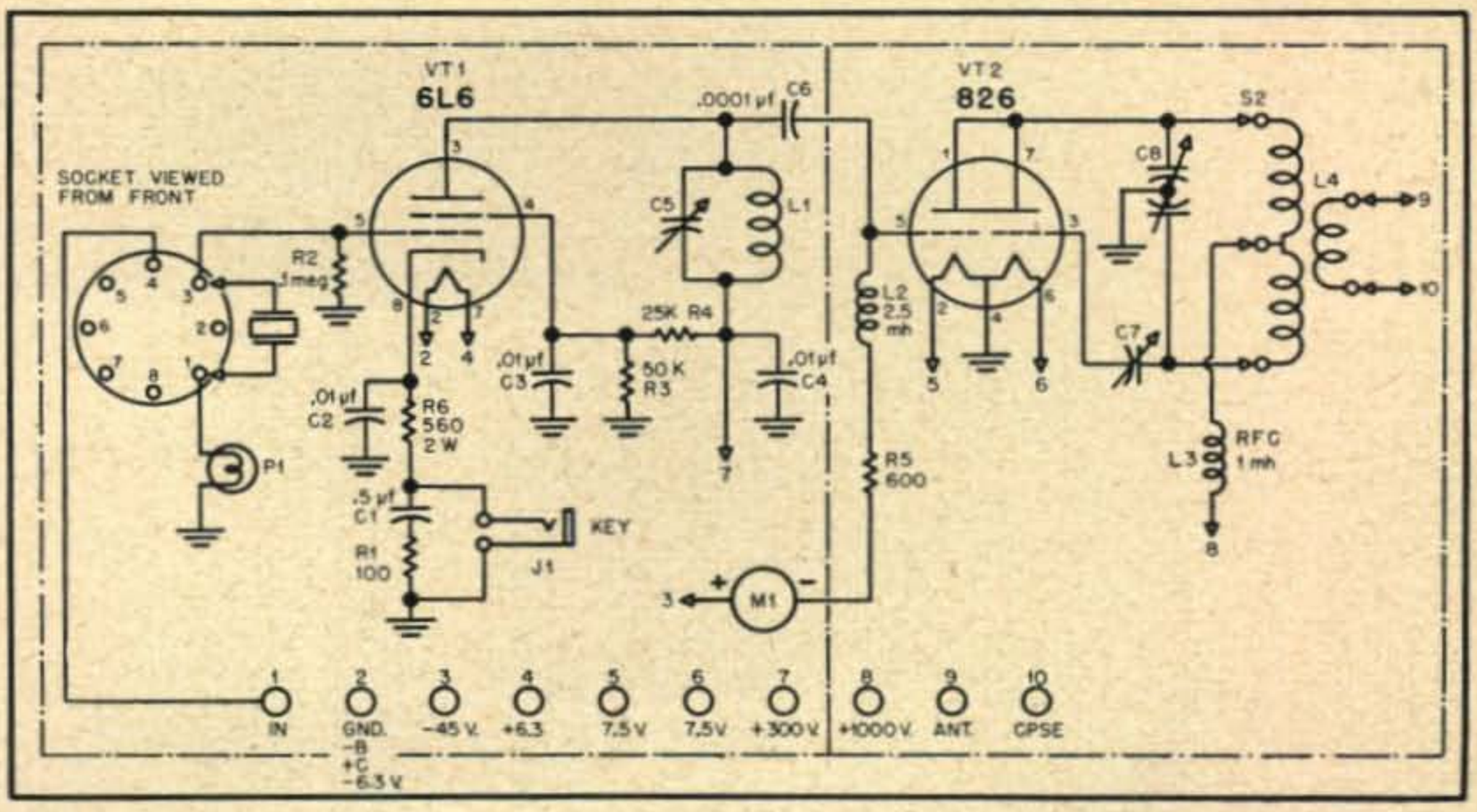


Fig. 1. The 375E after conversion. The 6L6 low voltage supply is mounted in the vacated tube compartment. The rewired antenna tuning and loading section is shown in the lower right-hand corner.

C1, C5, C6—0.1 µf, 400 v.
C2, C3, C4—.001 µf, mica.
C7, C8—4.0 µf, 600 v.
C9—in original circuit.
C10—dual 15 µµf, variable.
C11—in original circuit.
R1—25K, 10 w.
L1, L2—surplus inductances.
L3—surplus filter choke.
L4—rotary inductance in the original circuit.
T1—surplus power transformer.
T2—fil. trans., 6.3 v. T3—fil. trans., 7.5 v.

Fig. 2. Wiring schematic of the drawers for use with the converted 375E. Each drawer contains a separate transmitter.



C1—0.5 µf, 600 v.
C2, C3, C4—.01 µf, mica.
C5—in original circuit.
C6—.0001 µf, mica.
C7—Millen 15001.
C8—dual 100 µµf, variable.
R1—100 ohms, 1 w.
R2—100K, ½ w.
R3—50K, 10 w.
R4—25K, 10 w.
R5—600 ohms, 10 w.
L2—2.5 mh.
L3—1.0 mh, in original circuit.
P1—60 ma pilot bulb.
L1—80 meters—26 turns on surplus form.
40 meters—17 turns on surplus form.
20 meters—11 turns on surplus form.
L4—80 meters—JVL 80.
40 meters—JVL 40.
20 meters—JVL 20.

The Six and Two

L. P. NEAL, W1OKQ*

A transmitter for the two most popular v-h-f bands, incorporating all the features for maximum efficiency and operating enjoyment.

THE PAST six-meter DX season has demonstrated that a transmitter of about 100 watts input is adequate to work most anything heard. A v.f.o. has become almost a necessity when the band-edge QRM becomes as tough as it is during an opening. A transmitter embodying these features must not become too cumbersome in tuning. In addition, for those plagued with BCI in the congested cities, FM offers a measure of relief and was considered a necessary feature.

It was from these considerations that the "Six and Two" was designed. Some lessons gained from use of war equipment were included, namely dividing the complete unit into sections or sub-chassis, which in turn are mounted on a regular rack-type panel and chassis. In the Six and Two, the AM circuits and power supply are built on a 10" x 12" x 17" chassis and 8 ¾" panel. The r-f deck is given over to a low voltage regulated supply, an FM sub-chassis, and an r-f sub-chassis. Provision is made for using AM, FM, or c.w. by keying only the final. Through the use of a tone oscillator, A2 is available on AM or FM.

The R-F Circuits

The oscillator is a conventional Hartley type e.c.o., doubling in its plate circuit, with output twice the grid tank frequency of 12 mc to 13.5 mc. The second stage is a doubler and delivers 50-mc energy to the 829 grids. On 50 mc the 829 runs straight through and is capable of 80 watts output. By merely changing the tank coil to one in the 144-mc range, the 829 becomes a tripler with output on two meters. The output when tripling is somewhat better than the usual SCR-522 set-up.

*35 Edison Green, Dorchester 25, Mass.

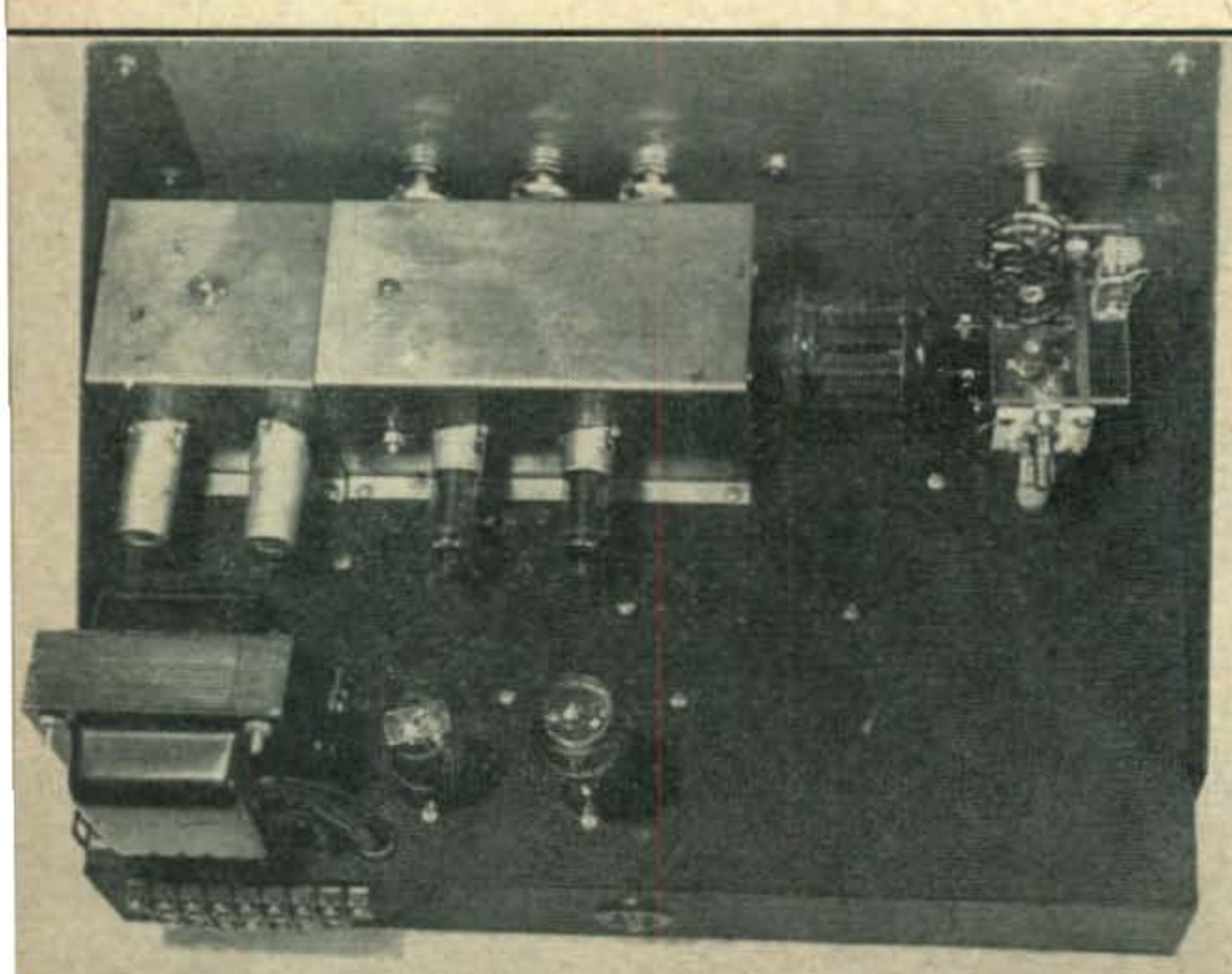
Several attempts have been made to provide balanced drive to the 829 from an inherently unbalanced source (the plate tank of the second doubler) and they have proved to be both simple and successful. First it will be noted that *C10* is placed from *L3* to ground opposite the plate end of the coil. This is done to bring the r-f potential at the terminal ends of the coil to nearly the same value. Admittedly, an exact balance may not be obtained in this manner, but it is only the first step. The two coupling condensers, *C13* and *C14* do the rest of the job of providing a balanced voltage to the 829 grids. It is important in any type of push-pull amplifier that the grids be equally driven or linear modulation is very difficult to obtain. A split stator condenser would be an aid to balance, but one small enough for the sub-chassis used was not readily available.

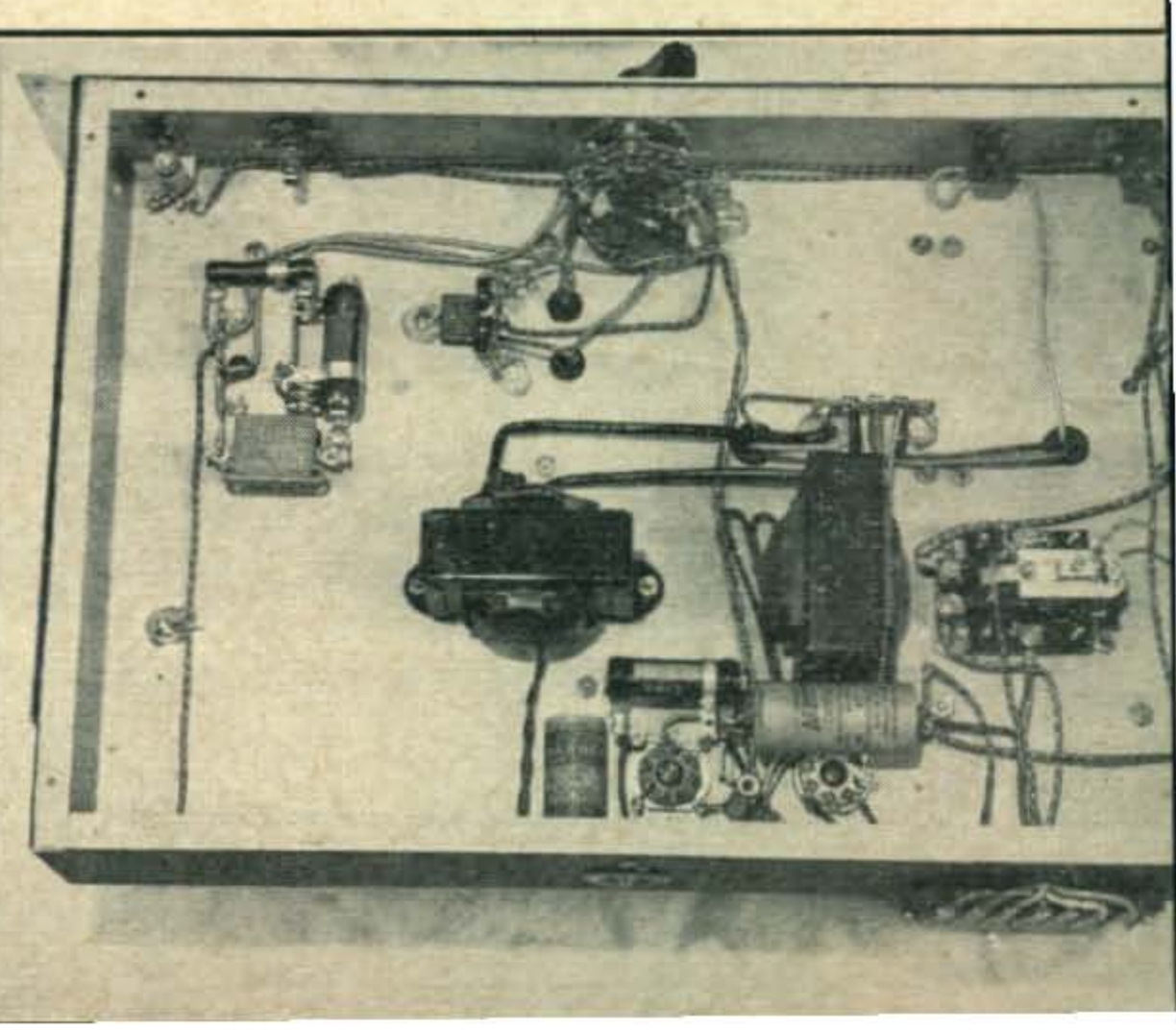
Modulators

The FM modulator is a standard reactance type, familiar to most amateurs. The two triode sections of the 6J6 provide ample gain from a crystal microphone to fully drive the 6BE6 reactance tube. The lead from the modulator tube to the oscillator tank is kept to one inch in length by placing the FM unit against the r-f sub-chassis.

The gain control (or deviation control) is *R14*. *C19* should be all that is required to keep the mike cool and prevent feedback, but in some installations there is a bit of r-f leakage. In this case simply put a 50K to 100K resistor in series with the grid of the 6J6 input section and leave the 100-$\mu\mu$f condenser "as is."

The 40-watt AM unit is built into the power supply deck and is conventional except that the 6L6s are driven from the cathodes of the 6SN7s. Such a circuit dispenses with the need of a driver





Top and bottom views of the r-f deck. The driver stages and FM modulator are housed in the two small cans on the chassis top. On the deck also, is the low-voltage plate supply.

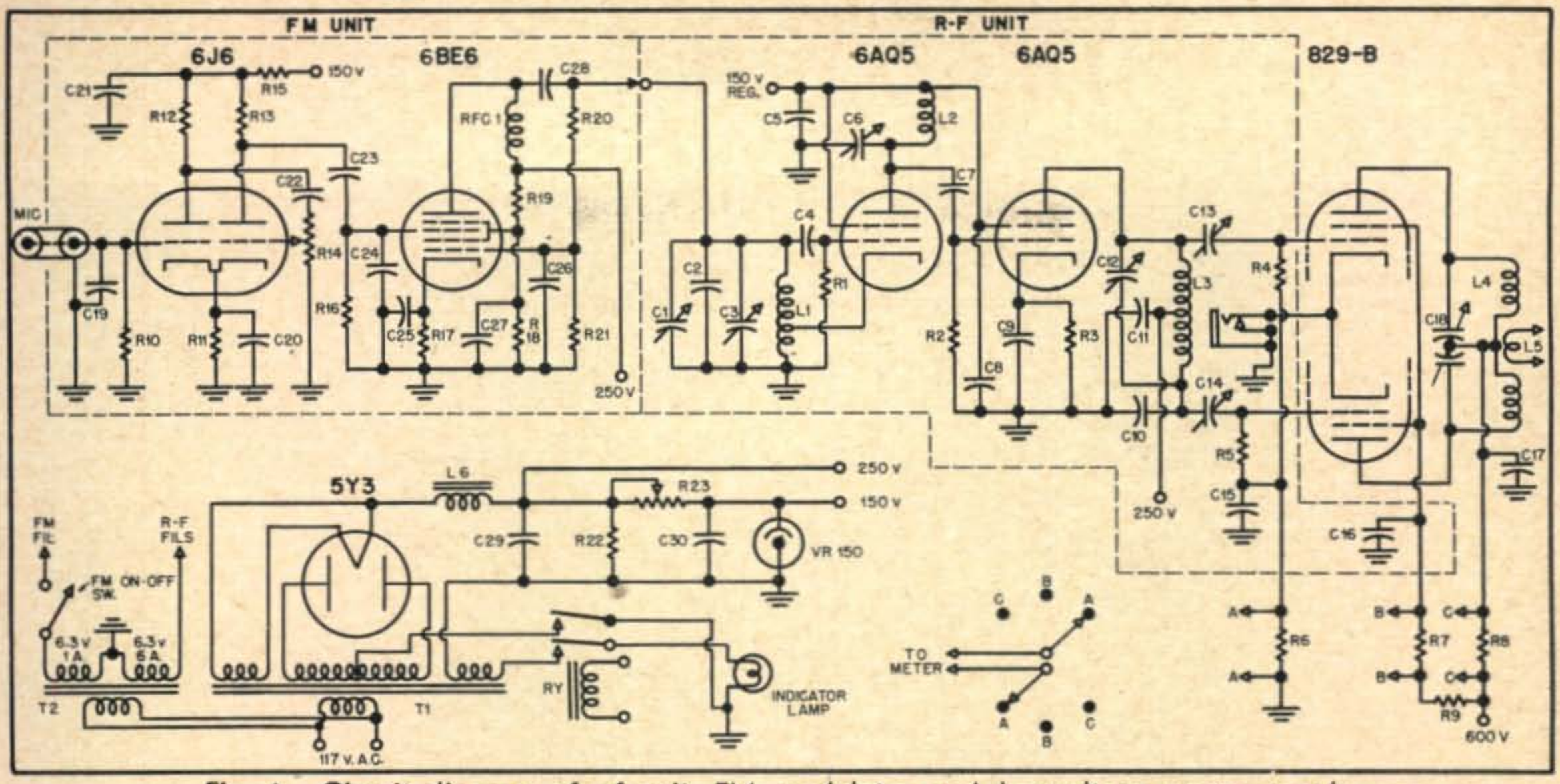


Fig. 1. Circuit diagram of r-f unit, FM modulator and low-voltage power supply.

R.F. Unit Parts List

C1, C3, C6—50 μμf, midget variable.
C2—100 μμf (see text).
C4—100 μμf, mica.
C5—.002 μf, mica only.
C7—35 μμf, mica.
C8, C9, C11, C15—.002 μf, mica.
C10—10 μμf, Ceramicon.
C12—35 μμf, midget variable.
C13, C14—4-20 μμf, variable, Ceramicon.
C16—.001 μf, mica, 1 kv.
C17—.001 mica, 2.5 kv.
C18—Hammarlund, 35 μμf per section.
R1—75K, ½ w.
R2—100K, ½ w.
R3—250 ohms, 1 w.
R4, R5—12K, 1 w.
R6—100 ohms, 1 w.
R7—Two 150-ohm resistors in parallel.
R8—50 ohms, 25 w.
R9—13.5K, 25 w.
L1, L2, L3, L4, L5—See text.

FM Unit

C19—100 μμf, mica.
C20—10 μf, 25 v., electrolytic.
C21—8 μf, 450 v., electrolytic.
C22, C23, C25—.01 μf, mica.
C24—200 μμf, mica.
C26—10 μμf, mica.
C27—1 μf, 400 v.
C28—250 μμf, mica.
R10—1M, ½ w.
R11—50 ohms, ½ w.
R12, R13—75K, ½ w.
R14—500K potentiometer.
R15—3K, 1 w.
R16, R21—500K, ½ w.
R17—150 ohms, ½ w.
R18—150K, 1 w.
R19—20K, 1 w.
R20—50K, ½ w.
RFC1—2½ mh choke.

Power Supply

C29—20 μf, 450 v., electrolytic.
C30—12 μf, 450 v., electrolytic.
R22—25K, 25 w., fixed.
R23—5K, 25 w., variable.
T1—300 v. each side center, 90 ma, 5 v., 3 a; 6 v., 2½ a., Thordarson.
T2—6 v., 6 a.; 6 v., 1 a.
L6—15 h., 100 ma., choke.
Ry—Relay 117-v. a.c. DPST.
Meter—0-200 ma, or 0-25 ma with shunts across points B-B, C-C to multiply range as desired.

transformer but does require a negative voltage source. The negative voltage is obtained from the 6X5 and the simple *RC* filter shown in *Fig. 2.* Unless one has had some experience with cathode drivers, it would be well to call in another amateur who has, to aid in the initial adjustments.

Construction

The two decks are standard 12"x17"x3" steel chassis, cadmium plated and painted on the top and sides only. Do not use aluminum chassis in the r-f deck because of the difficulty of getting good r-f grounds on aluminum. All grounds should be securely soldered to the chassis or secured by means of large star-type lugs. The wiring may not look as neat this way, but it provides much more security against "floating grounds." The panels are 8¾" x 19" x ⅛" aluminum and, after all holes have been drilled, may be finished in a color to suit the individual.

The FM and r-f sub-chassis were made of #20 gauge sheet brass, but of course copper may be used, or even galvanized iron, though the copper and brass are much better. Such chassis are not commercially available so the local tinshop was called upon to do the job. The FM chassis is 3½" high by 3¼" wide by 3½" long and the r-f chassis is 3½" high by 3¼" wide by 6½" long. Both have ⅜" bends for mounting flanges. After forming the stock to the given dimensions, the result is an open channel, U shaped. From the same stock, cut a flat piece just large enough to fit into one of the open ends and solder it firmly into place. This is the suport for the 829-B socket, so it is well to cut the socket clearance hole before soldering into the sub-chassis. One end is left open and this is the end where the oscillator is located. The FM sub-chassis is closed at each end by similar flat pieces of the same stock. The power leads and the microphone lead of the FM unit are placed on tie points inside their respective chassis. A grommet lined hole in the deck allows the leads to be extended through the deck to the points of connection to the power supply leads. This type of construction keeps all leads carry-

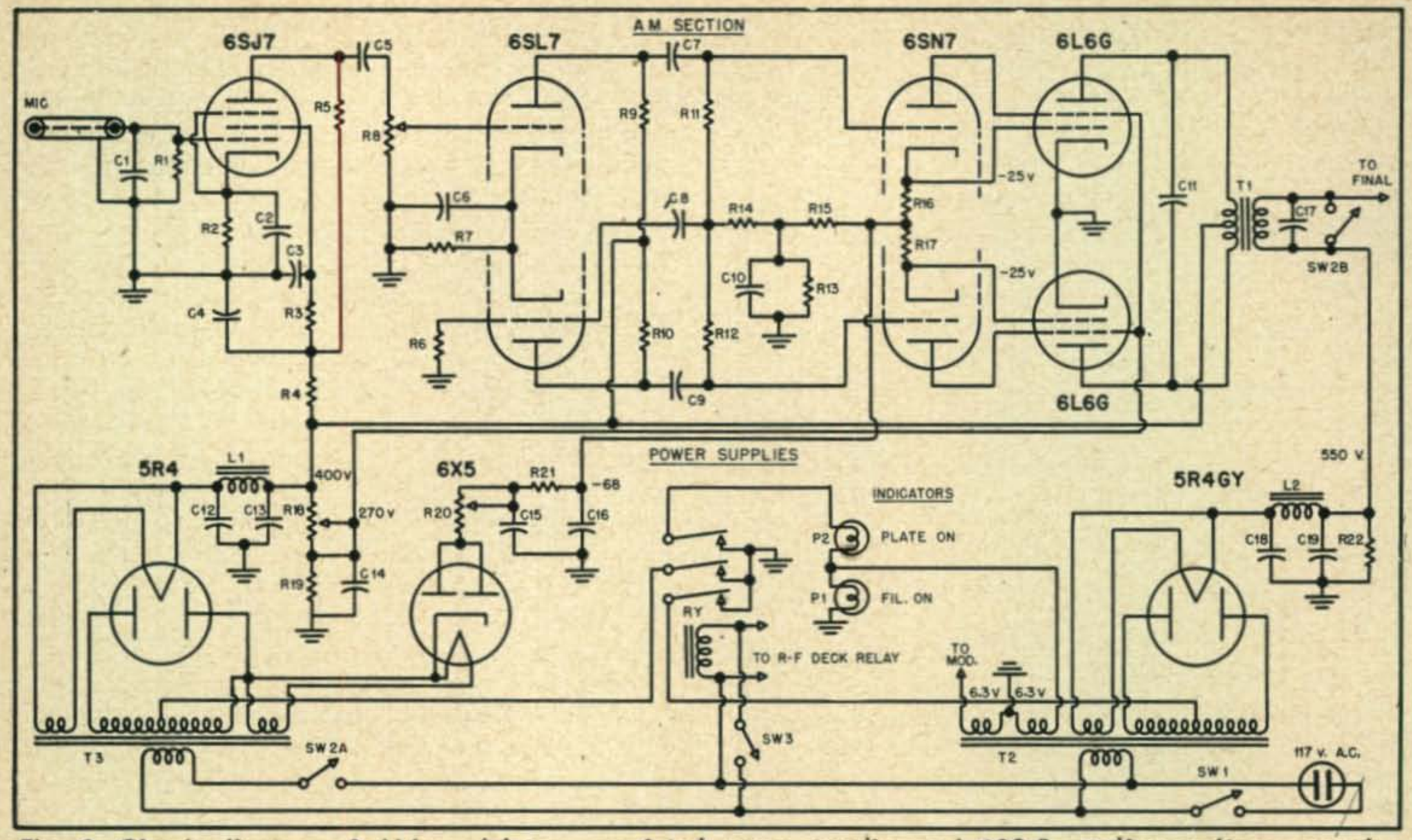


Fig. 2. Circuit diagram of AM modulator, associated power supplies and 829-B medium-voltage supply.

C1—100 $\mu\mu$f, mica.
C2, C6, C10—25 μf, 25 v., electrolytic.
C3—.1 μf, 400 v., paper.
C4—8 μf, 450 v., electrolytic.
C5, C7, C8, C9—.01 μf, 400 v., paper.
C11, C17—.001 μf, 1 kv., mica.
C12, C18—6 μf, 600 v., oil filled.
C13, C19—10 μf, 600 v., oil filled.
C14, C15, C16—12 μf, 450 v., electrolytic.
R1—1.5 meg., 1/2 w.
R2—750 ohms, 1/2 w.
R22—Two 150K, 1 w. in series.
T1—50 w. mod. trans.
T2—UTC S-40.
T3—400-0-400, 250 ma, 5 v., 3 a.; 6.3 v., 3 a.
Ry—117-v. a.c. relay TPST.
L1, L2—15 h., 250 ma.
SW1—SPST 10 amp.
SW2A, SW2B—Ceramic DPST, 1 kv.
SW3—Remote control SW 117 v., 3 a.
P1, P2—6 v. pilot light.
R3—1 meg., 1 w.
R4—50K, 1 w.
R5, R9, R10—250K, 1/2 w.
R6—1 meg., 1/2 w.
R7—1500 ohms, 1 w.
R8—1 meg. potentiometer.
R11, R12—350K, 1/2 w.
R13, R15—22K, 1 w.
R14—100K, 1/2 w.
R16, R17—7K, 1 w.
R18—3K, 25 w.
R19—25K, 10 w.
R20—5K, 10 w.
R21—2K, 10 w.

ing r.f. inside the sub-chassis. The neighbors are much happier as a result.

Bear in mind that the oscillator is the heart of the r-f section and that all leads in this circuit must be short, direct, and of heavy stiff wire, preferably not smaller than #14. Such construction will pay off by providing a stable rig. *L1* has 8 turns of #14 enameled wire wound after stretching on a 3/4" o.d. ceramic coil form. The wire must be tight on the form after winding and soldering the ends down. This coil is tapped two turns up from the ground end for the cathode connection and the wire is spaced so that the winding length of the coil is one inch. Mount the coil mechanically solid on the chassis, the cold end near the metal.

The 50-$\mu\mu$f tuning condenser, *C1*, originally was of the screw-driver set type of midget condenser from which the brass retaining ring was removed and a 1/4" o.d. hollow shaft pressed on. This condenser need not be of the straight line capacity type because of the high-*C* grid tank. *C3* may be termed the "band set" condenser because it permits getting the 12 mc point on the oscillator tuning dial at about 5 points or divisions on a 100-division dial. It is a 50-$\mu\mu$f midget air condenser, screw-driver set type with a shaft locking nut. *C2* is actually two condensers, both fixed, one with a value of 75-$\mu\mu$f zero coefficient, and the other a 25-$\mu\mu$f negative coefficient. They are of the ceramic type and are placed in parallel across the grid tank coil.

L2 is wound with #14 enameled wire on a 1/2" diameter form (which is removed after winding) and the coil is stretched to a one wire diameter spacing. Because this coil is self-supporting, the mounting leads must be short. Ceramic pillars make ideal supports. The rotor of *C6*, the tuning condenser of *L2*, is grounded directly to the chassis, and *C5* places *C6* across the coil electrically. This method eliminates any traces of hand capacity and simplifies the mounting problem.

L3 consists of 8 turns of #14 enameled wire again wound on a 1/2" form and spaced so that there is one wire diameter between turns. The coil is center tapped and self-supporting. The com-

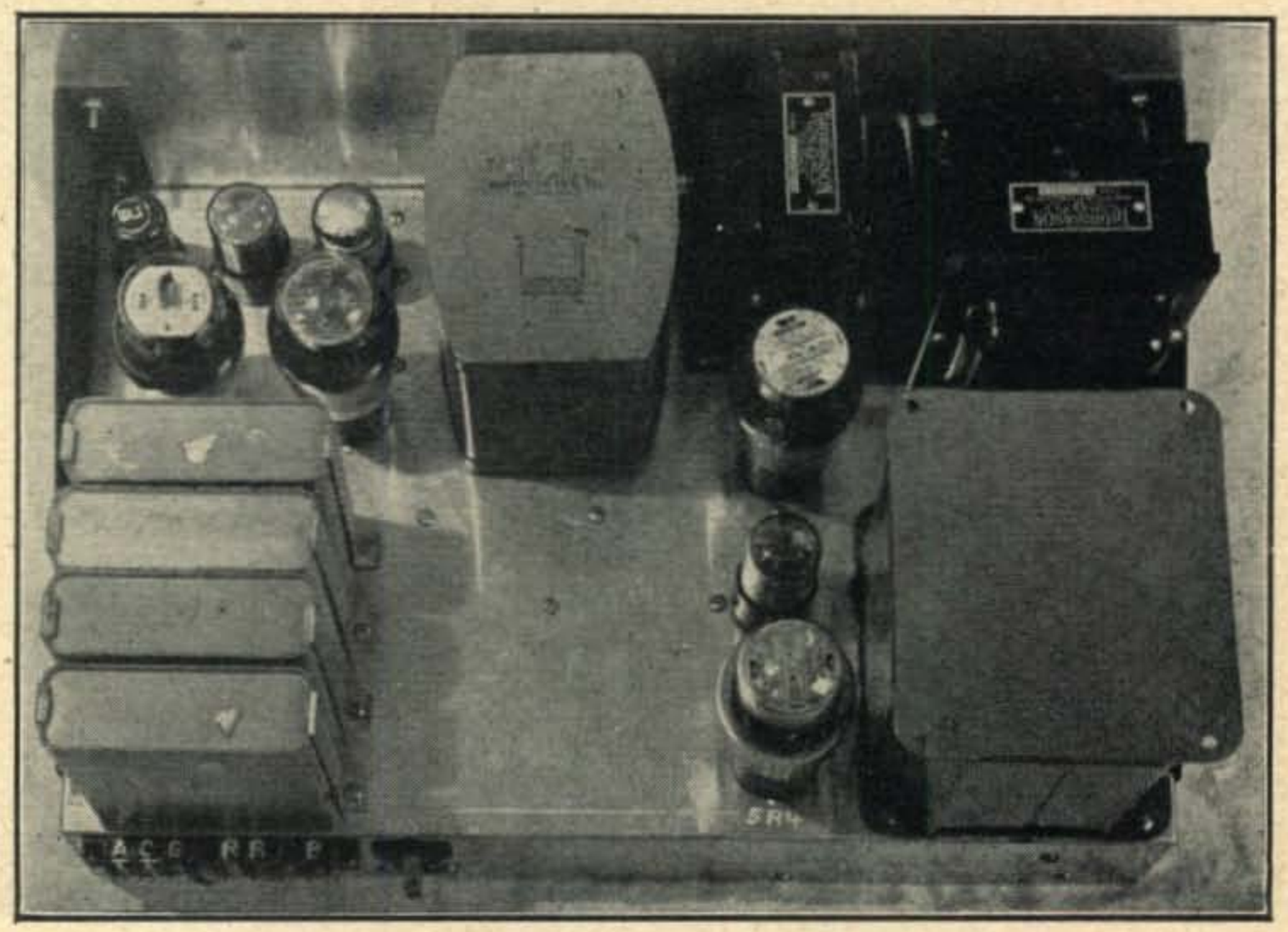
paratively larger *L/C* ratio sets up conditions favorable for doubling and provides a higher tank voltage (terminal voltage) for the 829 grids. *Caution*—with the *L* and *C* values used in this tank it is still possible to tune this circuit to 75 mc with good output. An absorption wavemeter or dipper is a necessity when tuning up for the first time.

L4 is the 829 50-mc plate tank coil, 6 turns of #14 enameled wire center tapped, one inch i.d. and is 1½" long. The two halves of the coil are separated by ⅜ inch to allow entry of the swinging link. The base of this coil mount is made of ¼" thick polystyrene 2"x3" sheet. The pillar that supports the link assembly is also polystyrene, ⅜" thick by ½" wide by 1⅜" long. This is drilled at one end, and tapped for a 6-32 screw for mounting to the coil support base. The pillar is drilled opposite the mounting end to take a ¼" polystyrene rod. Just above and clearing this hole, there is another drill hole for a 6-32 screw which is the locking screw for the ¼" link shaft. The coil base assembly is fitted with two right-angle brackets to provide a mount for the Hammarlund tank condenser. Before mounting the polystyrene pillar to the base, use a bit of polystyrene cement on the contacting surface and tighten the 6-32 screw carefully. If no polystyrene cement is available, benzene may be used (but with caution,) because it is a good solvent for polystyrene.

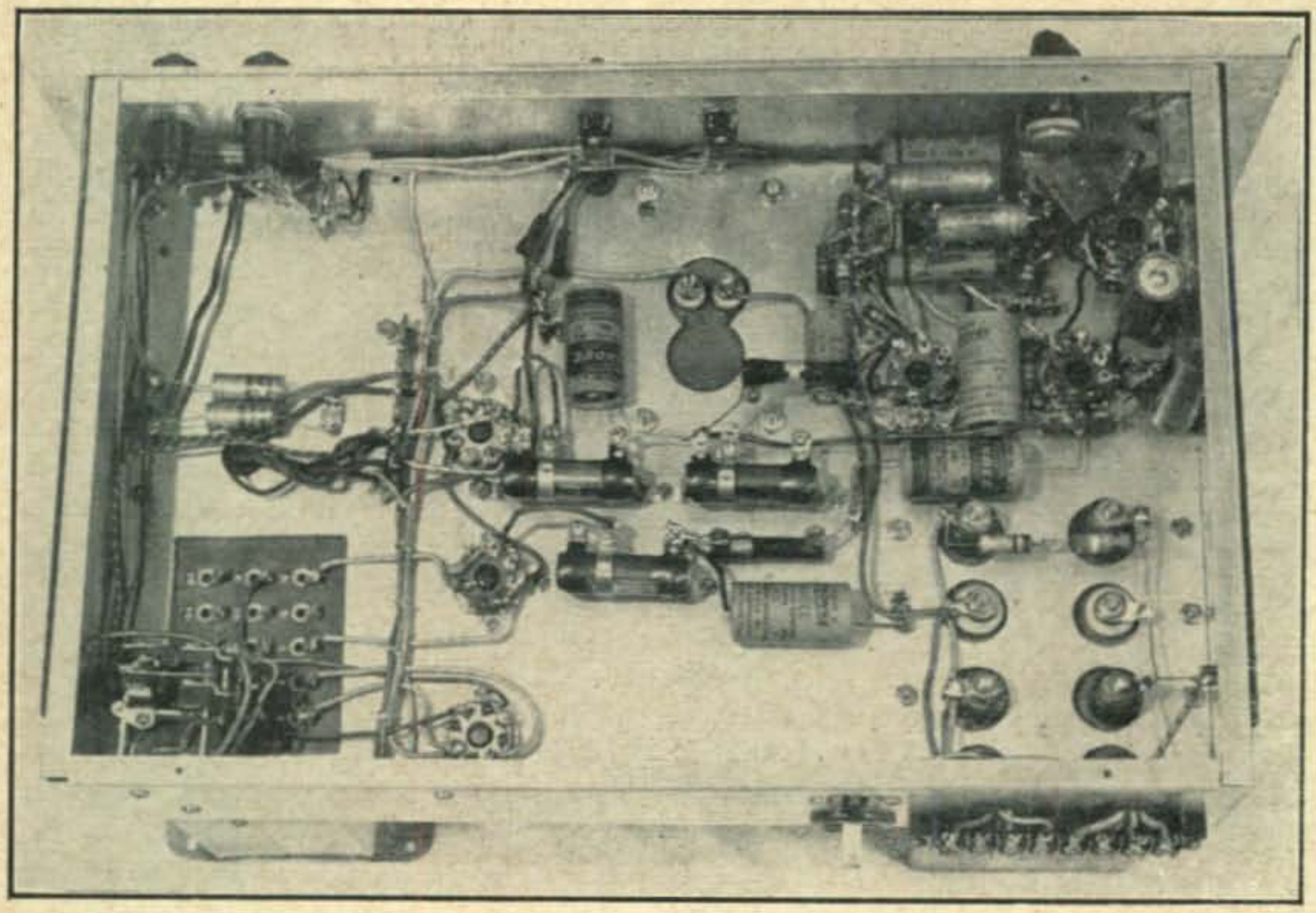
The 144-mc tank coil is made of #14 wire, and has an i.d. of ¾ inch, one turn each side of center. If an identical tank condenser to the one specified is used and lead length kept to a minimum, the two turns will be spaced about ¾ inch apart. It will be necessary to do a certain amount of pushing together or pulling apart to get the right value of *L*. The tank condenser should be about one third meshed at resonance. Check the frequency with a 144-mc wavemeter or dipper. Unless one has a lot of 829s, it is a good policy to reduce the plate voltage to not more than 400 volts when using the rig on 2 meters. The efficiency of a tripler is roughly only 30-35 per cent. This means that 12 to 15 watts output may be expected at 40 watts input on 144-mc.

When the wiring of the r-f chassis is complete, and before mounting to the deck, connect it to a source of a regulated 150 volts, 250 volts and 6.3 volts for the filament. Plug in the 6AQ5 oscillator tube, and turn on the filament. Mesh the tuning condenser about half way and turn on the 150-volt source. Tune the plate condenser to resonance. Shut off the 150 volts and plug in the 6AQ5 doubler tube and the 829. After 30 seconds warm up, apply both the 150 volts and the 250 volts. *C6* will require some adjustment because of the capacity of the doubler tube. Quickly tune *C12* to resonance. At this point, check the frequency range of the oscillator by means of a well calibrated receiver or good frequency meter. It should cover 12 to 13.5 mc with some overlap. It will be necessary to adjust *C3* to do this. With a wavemeter check the plate of the oscillator to see if it is doubling to 25 mc. Then check the tank of the doubler which should be on 50 mc. Remove the jumper between the two tie points at the ground end of *R4-R5* and connect to a 0-25 ma meter between *R4* and ground. If two meters of suitable range are available, much of the following work will be avoided. Connect a jumper from *R5 to* ground and adjust *C13* to give 7 ma of current flow. Keep *C12* in resonance at all times. Remove the ground on *R5* and put it on *R4,* insert the meter in *R5* return and tune *C14* for 7-ma flow. Repeat this process several times, for the larger adjustments of *C13-C14* react upon each other. While 6 ma is the maximum grid current (for single grid) of the 829, it is desirable to tune for 7 ma and then detune the doubler slightly to provide a bit of reserve power to compensate for tube aging and other variable factors. The doubler runs with low screen voltage so that this operation is permissible. When these conditions have been met, the unit is ready to be installed on the r-f deck. Reconnect the jumper at *R4-R5* tie points.

When the FM unit is wired, it may be tested on the bench with a microphone connected and a source of power. Isolate a pair of phones with a couple of .01-μf condensers and test at each plate. It may be that nothing will be heard at the plate of the first stage which will depend upon the level of the mike used. After ascertaining that



Medium-voltage power supplies and AM modulator. Front panel contains control switches and AM gain control.



Underside of medium-voltage power supplies and AM modulator chassis.

the unit is working properly, it may be mounted on the r-f deck.

A glass-type feed-through insulator (ceramic is equally good), provides the connection between the FM unit and the oscillator grid tank. Put it in the end wall next to the oscillator to keep the lead length very short. Form a piece of stiff wire in a U shape, solder and push the FM unit into place. Double check with an ohmmeter for shorts.

The photo of the r-f deck shows the final tank circuit well enough so that it may be easily duplicated. After the r-f sub-chassis and FM sub-chassis are mounted and the power supply is compieted, give the r-f section another test. One may well ask how these circuits may be checked with a wavemeter when the coils are concealed in a metal chassis but the answer is quite simple. There is enough power present at the plates of the 6AQ5s to light a wavemeter panel bulb (brown bead) or deflect a grid dip meter. Just place the pick-up coil of the instrument over the tubes. When it is known that all circuits are on the right frequency, apply reduced voltage to the final plate and screen. A 3K 50-watt resistor in series with the 600-volt lead will reduce it sufficiently. Be sure the AM switch is *off*. Switch the plate meter in, turn on the high voltage and tune *C18* to minimum plate current. No value of plate current will be given for it has been found to vary over wide limits with various 829s and will, of course, depend on the voltage of the power supply and value of resistor selected. When it is certain that the final is operating correctly, the resistor may be removed and the full voltage applied. This should be done with either a dummy antenna tied to *L5* (a 100-watt bulb will do nicely) or the transmitting antenna. It is better to use the dummy for these tests for several obvious reasons.

Set the communications receiver to the oscillator grid frequency, or if the receiver will go to 25 mc, tune to that frequency. Connect the microphone to the FM input and turn on the power to all circuits. It's a good idea to use a pair of phones in the receiver to eliminate audio feedback to the mike. Advance *R14* until the FM signal can be copied. Next short the antenna terminals of the 50-mc receiver to ground and tune in the transmitter signal. *R14* will have to be reduced somewhat to get an intelligible signal. The amount of deviation required at 50 mc can be determined in this manner.

It has been assumed that the AM channel had been bench tested prior to these last checks. *SW2* may now be placed in operate position and the AM tested in the usual manner, with the dummy antenna. In this case, the bulb should increase in brilliance slightly as the rig is modulated.

The total drain on the power supply on the r-f deck is 85 ma of which the FM unit takes 6 ma. The rest is taken by the VR tube. bleeder. oscillator and doubler. The 600 v. supply must be capable of a maximum drain of 180 ma for the plate and screen of the 829.

New York City Hamfest

A hamfest and dinner will be held on Monday, May 16, under the sponsorship of the YL Club of New York City, at the Hans Jaeger Restaurant, 85th St. and Lexington Ave., beginning at 7 p.m. All OMs, YLs and XYLs are invited. There will be door prizes, and speakers will include FCC Engineer Arthur Batcheller and Gay Milius, W2-NJF, alternate director of the Hudson Division. $3.25 covers all charges (no extra tipping), and tickets may be purchased in advance from Ruth Siegelman, W2OWI., 1414 Wythe Place, New York 52; or Sophie Lash, W2QGK, 150 Sneideker Ave., Brooklyn 7, N. Y.

Amateurs and the Citizens' Band

WILLIAM B. VALENTINE, W4LDW*

What does the Citizens' Radio Service mean to the average amateur? Will it augment our existing frequencies or compete for them? Here are the facts as they now apply to the public's "ham" band.

EVER SINCE THE Federal Communications Commission announced, shortly after the end of hostilities, the allocation of a band of frequencies for a so-called "Citizens' Radio Service," the questions have been flying thick and fast. "What is it?" "Who can operate on the band?" "Is it to be exclusive, or shared with some commercial service?" And, foremost in the minds of most of us, "Just how will this Citizens' Radio Service affect me, the average ham?"

What Is It ?

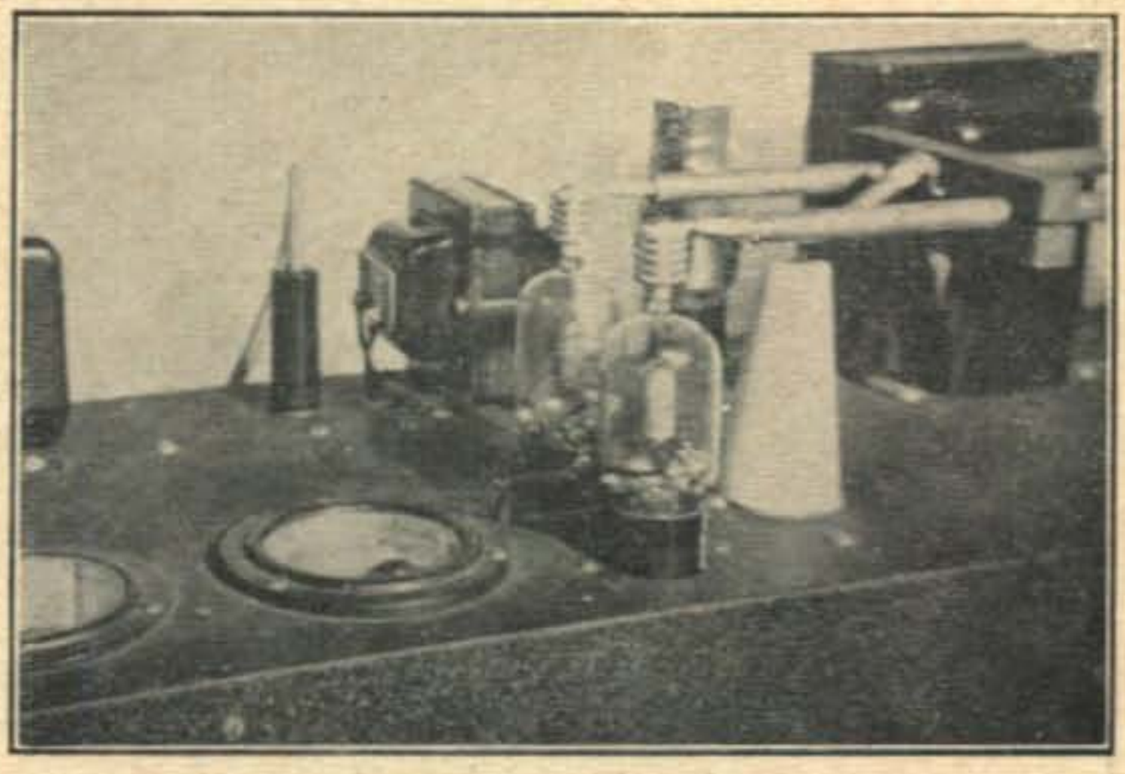
First of all, it should be stated that the new band is definitely not intended exclusively for hams. Your ham ticket will not be an automatic permit, and it is unlikely that much, if any, of your present gear will be usable here, due to the rather stiff equipment specifications which have been set up. The primary purpose which the band is intended to serve is that of providing a place in the spectrum where Mr. John Q. can "get on the air" if he wants to. Licensing will be of *equipment,* not operators. According to the so-far-tentative rules set up by the Commission, any citizen, eighteen or more years of age, is eligible to apply for a station license for a station to be operated in the Citizens' Radio Service. Any person may operate such a station, provided he has the permission of the owner/licensee. The band chosen, 460-470 mc, is high enough so that the operation will be limited, practically, to line-of-sight work, and, also because of the high frequency, equipment size and weight can be kept at a minimum.

The new band will not be shared with any other service, but this doesn't mean that there will be only voice modulation. The rules state that the frequencies may be used for "private and personal communication, radio signaling, control of objects by radio, and any other purposes not specifically prohibited . . ."[1] Remote door-opening or closing equipment for the garage, model airplane control, even television (consistent with the maximum channel width requirements!)—all will be legal in the new band. There will be no cross-band work with other stations, however, as the rules go on to say that "each station is authorized to communicate with other stations in *this service.* Communication with . . . (any other) . . . station is prohibited."[2]

Licensing

Although the Commission adopted the technical specifications for the band on December 1, 1947, the regulations regarding the licensing procedure are not yet in effect. The list of proposed rules has been announced, but is still awaiting final action by the Commission. Hams will, apparently, have to apply for a license just as will John Smith, next door. Another thing of interest to the ham, is the fact that, if he does own and operate a rig in the Citizens' Band, he won't be legally qualified to make frequency adjustments, changes, or tests during or after the installation of the gear unless he has a *commercial* ticket, either phone or telegraph. Subpart "D" of the operating rules (still tentative, remember) says: ". . . all transmitter adjustments or tests . . . shall be made by or under the immediate supervision and responsibility of a person holding a first or second class commercial radio operator license . . . and such person shall be responsible for the proper functioning of the station equipment."[3]

So there we have it. If you can qualify for a second 'phone ticket (which isn't too much harder than the Class A ham exam), you can, if you want, make a little financial return on your years of investment in ham radio. Regular radio servicemen, according to these rules, will not be permitted to service or adjust Citizens' Band equipment, unless they have a license. That means that, as usual, the ham is "in on the ground floor," as far as experience is concerned. Also, it is likely that, either before, or soon after, these rules go into effect, the Commission will decide that the hams are qualified, as a group, to work on this gear.



Experimental tuned line oscillator using HK-24s. Output about 1 watt on the 460-470 mc band.

*Research Asst., Dept. of Electrical Engineering University of Kentucky, Lexington, Ky.

1 Proposed Rules of Citizens' Radio Service, entitled: "Part 19—Rules and Regulations Governing the Citizens Radio Service"; Section 9.2 (a), Subpart A.
2 Section 19.52 (a). Subpart D.
3 Section 19.51 Subpart D.

Equipment

There is nothing tentative about equipment requirements, and there is nothing simple about them. It is expected that the band will be very popular, and consequently crowded, and so the channel widths, power, stability, and spurious-radiation specifications are pretty stiff, for a part of the spectrum where the modulated oscillator has for so long been considered standard. The frequencies available are subdivided into three channels within the total 460-470 mc band: 460-462 mc is for fixed operation with Class "A" stations only. 462-468 mc is for both "A" and "B," while 468-470 is for Class "A" stations, either fixed or portable. Those "A" and "B" classifications refer to the frequency tolerances. Class "A" stations must be held to within plus or minus 0.02% of the operating frequency, and must limit their communication band to a total width of 200 kc, but they are permitted a maximum plate-input power of fifty watts, while the Class "B" stations, although they are required only a plus-or-minus 0.4% stability, are held to a top input-to-final of ten watts. Emission for either type may be amplitude, frequency, or phase modulated for radiophone, telegraph, teletype, or facsimile only. If you want to use television, or maybe pulse-time modulation, you'll have to file an application for a Class 2 experimental license.

At this writing, only two companies have announced equipment intended specifically for use on the Citizens' band. Composite (home-built, that is) equipment may be used, *if* it meets the technical specifications of the Service, although you may be called upon to prove to a Commission representative that it does so. Surplus Armed Forces gear is available which will operate in this range, but only as a Class "B" station.

The writer has, for some time, been engaged in the development of equipment suitable for use on this band, in the Communication Laboratory of the University of Kentucky. Experience to date indicates that it will be well within the abilities of the average ham to construct equipment meeting both "A" and "B" requirements, without any special tools. A large number of tubes are available which will function with good efficiency at these frequencies as either oscillators or amplifiers. Even ordinary tubes can often be made to function after a fashion in this range, even though the efficiency is usually extremely low. Such tubes as the 8012, 8025, 2C39, 2C40, 2C43, and some 826s and 829s will oscillate, although in the case of the last two, it is often necessary to try several before one is found which will operate satisfactorily. An oscillator-amplifier rig, using a pair of 2C43s as oscillators driving a pair of 8012-As in a neutralized parallel-line circuit, showed stability characteristics under modulation which, while not quite up to Class "A" standards, were good enough to permit the signal to be copied in a superhet with a 250-kc bandwidth. Experience seems to show that, although crystal control is quite desirable, a master-oscillator power-amplifier type of rig will perform quite satisfactorily.

Receiving equipment for this band gives a bit more trouble than the transmitting gear. Two superregenerative receivers, one with an r-f stage, proved entirely inadequate when the power was held down to the required legal maximum. (Most of these tests were conducted in the high part of the amateur 420-450 mc band, using the writer's call, which permitted higher power to be used when needed.) A converter, operating into an FM broadcast receiver tuned to 100 mc, extended the operating range of the equipment almost threefold. The converter consisted of a crystal mixer, using a type 1N21B crystal, a 955 acorn-tube local oscillator, and one stage of broad band (100 mc)

TABLE I

Distance (*thousands of feet*)	Watts Input (*for reference received level*) Ground Plane Antenna	Watts Input (*for reference received level*) Extended Double Zepp
1.0	1.2	.65
4.5	5.5	3.0
6.35	4.8	2.5
8.3	9.0	4.8
9.25	8.9	4.76
12.3	(not received)	10.0
12.7	(not received)	10.0

(Continued on page 92)

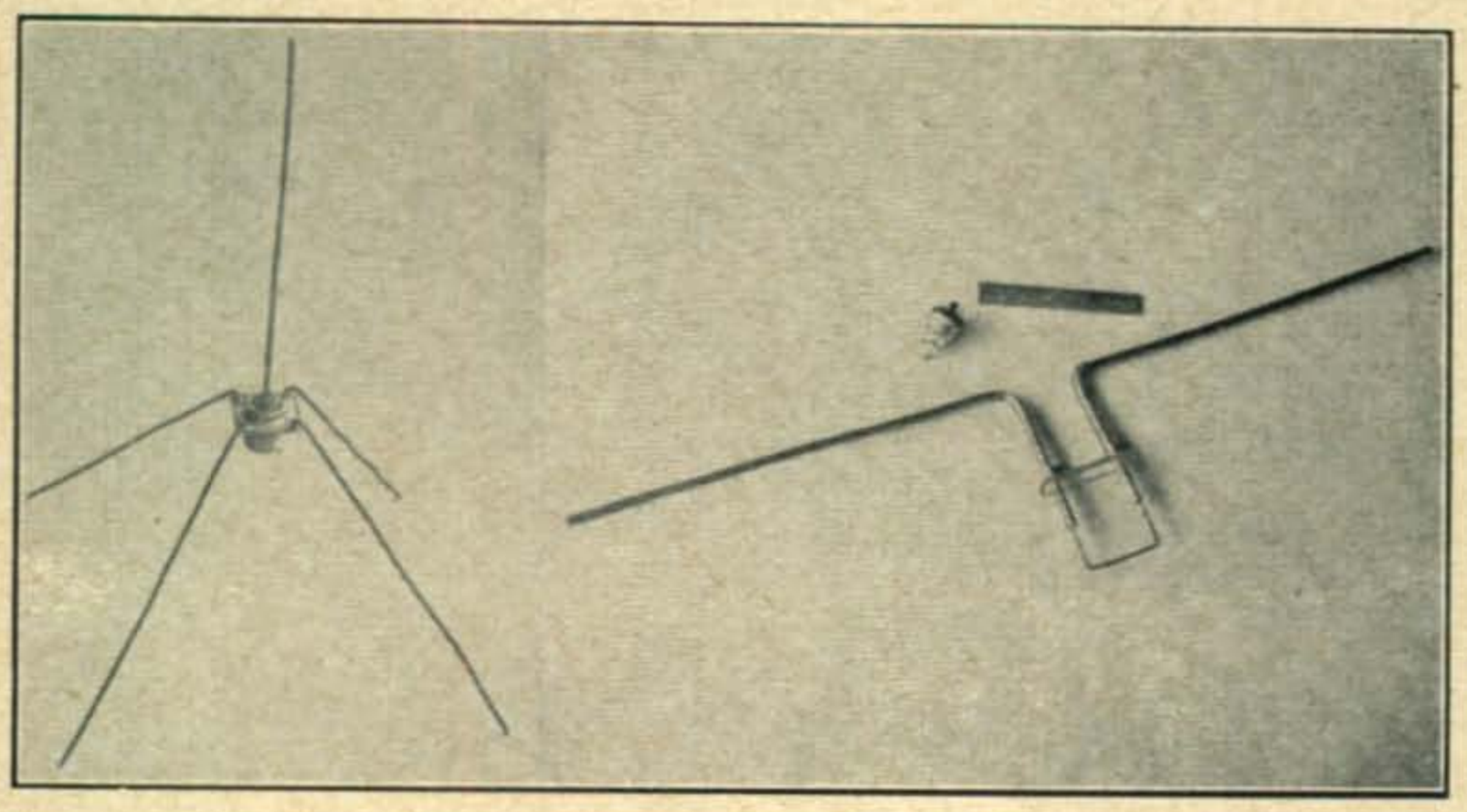


Fig. 1. Left: Ground-plane antenna used in transmitting tests. Fed with RG-8/U coax. Right: Extended double Zepp antenna used in transmitting tests. Fed with open wire line. Elements are 3/8" copper tubing. Lighthouse triode and 6" ruler shown for comparison.

Midget Code Practice Oscillator

STEPHEN S. PESCHEL, W2BEW*

A tone that approximates on-the-air signals makes learning the code easier.

Neon glow lamp code practice oscillator.

CODE PRACTICE OSCILLATORS have appeared in yearly handbooks and in scores of articles. Because of their value in the training of both amateur and commercial operators they will always be of interest.

Notwithstanding the large number of available articles on the construction of code practice oscillators, many beginners in radio shy away from the idea of building even the simplest transformer and battery tube type of unit. At the early stage of the game, this appears to be somewhat of a project, what with the necessity for proper phasing of the transformer windings and the selection of a suitable condenser for the desirable frequency. Beginners have been known to fail in their attempt to find a suitable transformer which would work with a given battery-type tube.

A sure-fire, and an extremely easy to assemble code practice unit, is the neon glow lamp oscillator, the basic circuit of which is shown in *Fig. 1*.

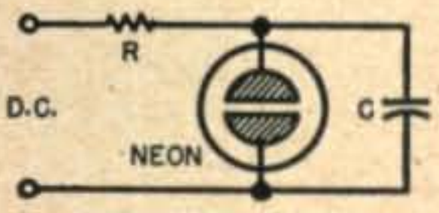


Fig. 1. Neon glow lamp oscillator basic circuit.

The frequency of oscillation is determined by the characteristic of the neon bulb, the applied voltage, the value of the resistor *R* and condenser *C*. Raising the voltage or lowering the resistor raises the frequency, whereas increasing the size of the condenser lowers the frequency of oscillation.

Although the d-c voltage required to start most of the neon glow lamps is approximately 80 volts, the power requirement is very small. In order to hold power requirements to a minimum, the Ne-2 1/25-watt neon glow lamp with a 2-megohm resistor can be used. For a 1000-cycle note the condenser turns out to be roughly .001 μf. The applied voltage may be between 120 and 135 volts.

Output for phones may be taken from different places in the circuit, *Fig. 1*: in series with the resistor, across the resistor, in series with the condenser, or across it. For best results using standard high-impedance phones, output should be obtained by breaking the condenser connection to the neon glow lamp and inserting the phones. The practical unit to be described features the following:

1) Extremely long life from smallest batteries—practically shelf life.
2) No "tube" replacements—the glow lamp, as used, will last indefinitely.
3) Several volts of audio output across high-impedance magnetic phones.
4) Very low cost.
5) Quick assembly—can be made up in a few minutes.
6) No sound in room—tone in phones only.
7) Good response to rapid keying—bug or machine.
8) Extremely small size, where this feature is necessary or desired.

The photograph shows one model of a practical unit housed in an old 2" meter case, 2 7/8" x 2 7/8" x 2-5/16". A half of the box is occupied by four No. 413 Eveready batteries, 30 volts each. The cover holds the binding posts for the key, and the two pin jacks for the phones. The three components shown in *Fig. 2* are mounted on the underneath of the cover. There is room to spare (for additional phone jacks, for instance).

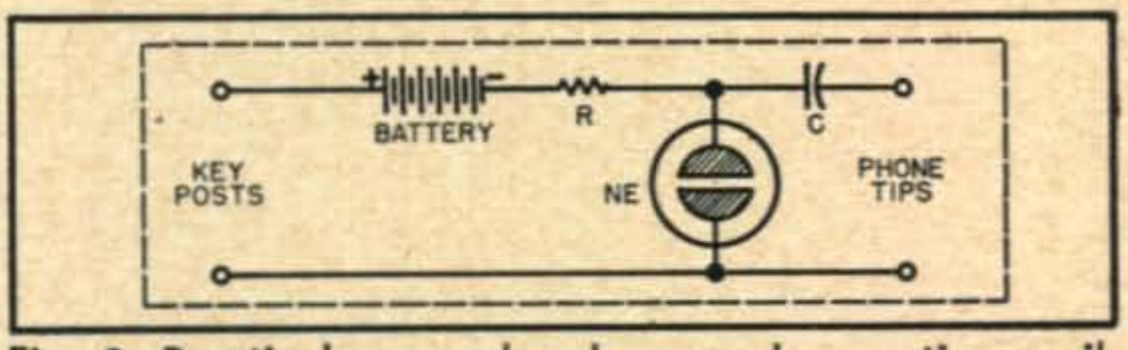


Fig. 2. Practical neon glow lamp code practice oscillator. R—2 meg., 1/2 w. C—.001 μf, midget, paper. Ne—1/25 watt neon glow lamp (Ne-2 with wire terminals). Batt—4 #413 Eveready 30-v. batteries.

Figure 2 parts list shows the extent to which compactness may be carried, if desirable. To stimulate classroom code practice, a vest-pocket unit was recently built and used. Through the use of miniature hardware the over-all size was reduced to 2½" x 2½" x 1¼", with two sets of twin pin jacks for input and output. Component cost for this match box job was under 50¢.

Where extreme compactness is not required, a lamp socket may be used with the Ne-51 neon glow

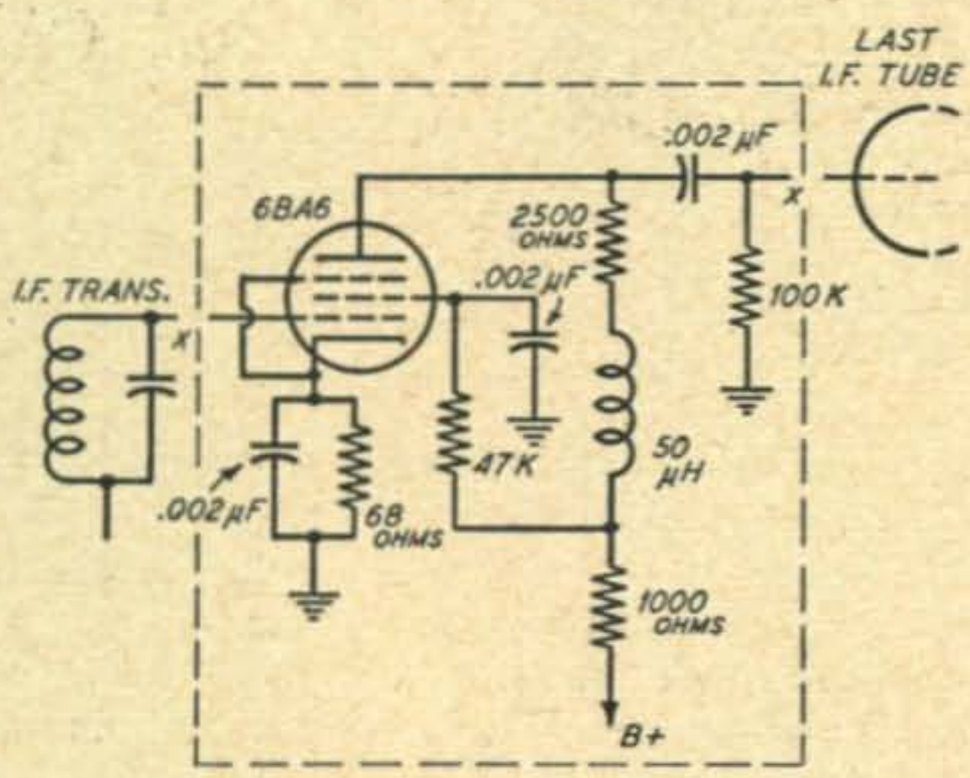
(*Continued on page 89*)

**562 E. Lincoln Ave., Mt. Vernon, N. Y.*

Inside the SHACK AND WORKSHOP

Untuned I-F Stage

Receivers that need a little extra gain may easily obtain 8 to 10 db by adding this untuned i-f stage. It should be inserted in the circuit of the receiver at the points marked "X" which break the lead from the i-f transformer to the signal grid. This

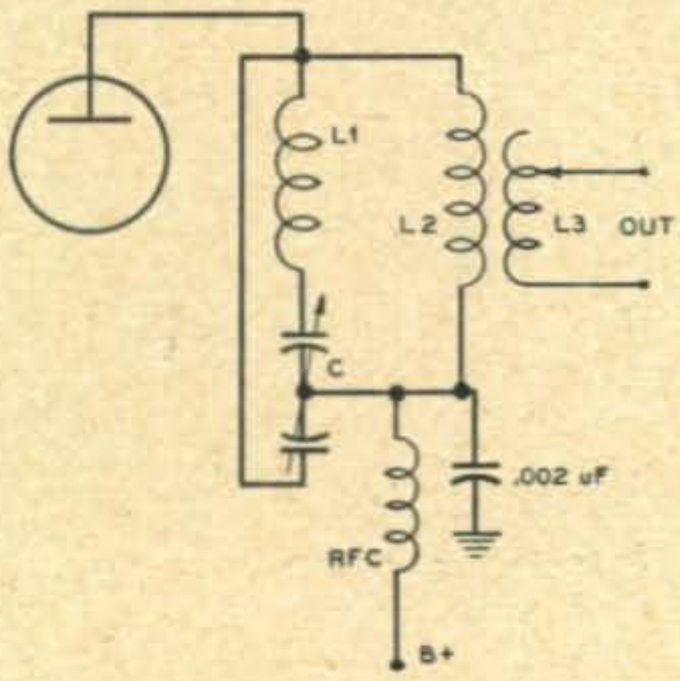


will effectively place the two i-f tubes in cascade. After the circuit is wired into the receiver, the i-f input transformer will require realignment. This is the only adjustment necessary.

Don Jeppesen, WØQFZ

All-Band Tank Circuit

A single-ended version of the well-known all-band tank circuit may be built using a dual 100-$\mu\mu$f variable condenser. The circuit shown will resonate near maximum capacity for 80 and 20 meters, and near minimum capacity for 40 and 10-11 meters. It



L1 - 12 TURNS NO.12 WIRE $1\frac{1}{4}$" I.D. $1\frac{3}{4}$" LONG

L2 - 18 TURNS NO.12 WIRE $1\frac{3}{4}$" I.D. 2" LONG

L3 - 12 TURNS NO.12 WIRE $2\frac{1}{2}$" I.D. 2" LONG OVER L2

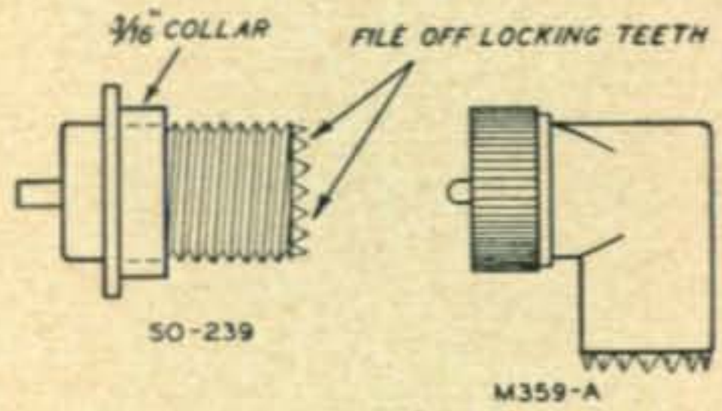
C - 100 $\mu\mu$F PER SECTION DUAL

tunes the 15-meter band near mid-capacity. Some care should be taken to see that 80 and 20 meters do not come at the same condenser setting, as this would cause excessive 4th harmonic output when operating on 80 meters. The same applies for 40 and 10 meters. If insufficient loading is experienced at 20 and 10 meters, even with all 12 link turns in use, a one or two-turn link around coil *L1* will load up the antenna on these bands.

Ken Leiner, W4NKQ (ex-W8LCN)

Rotating Coax Connector

All that is necessary to make a simple rotating coax connector between, for example, the SO-239 receptacle and the M359-A angle plug adaptor, is

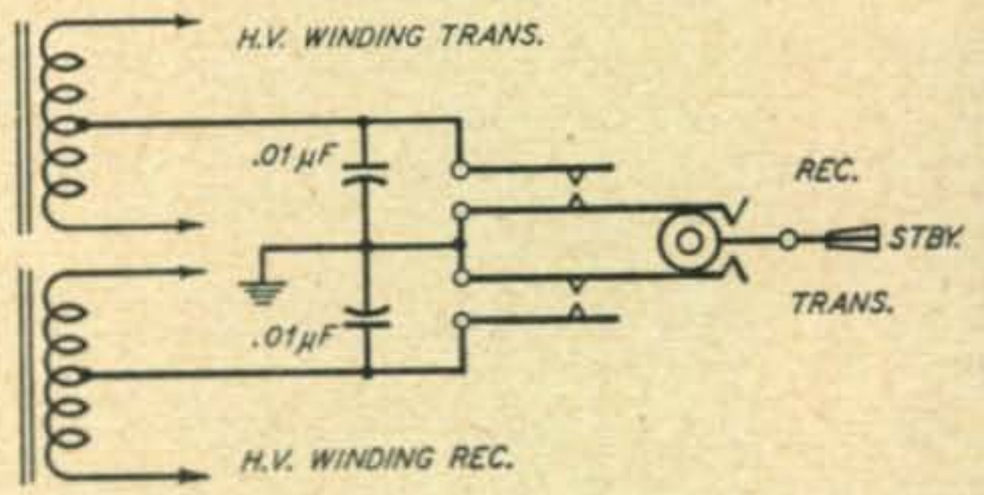


to file off the teeth of the receptacle and slide a collar (3/14" wide) over the threads. Slip the two together and tighten down with the threaded collar on the M359-A. Since the two collars are free to rotate, and there are no engaging teeth, the joint will turn smoothly. Although the connection is not absolutely rigid the power losses appear to be negligible.

Edward V. Cordes, Jr.

Transmit-Receiver Switch

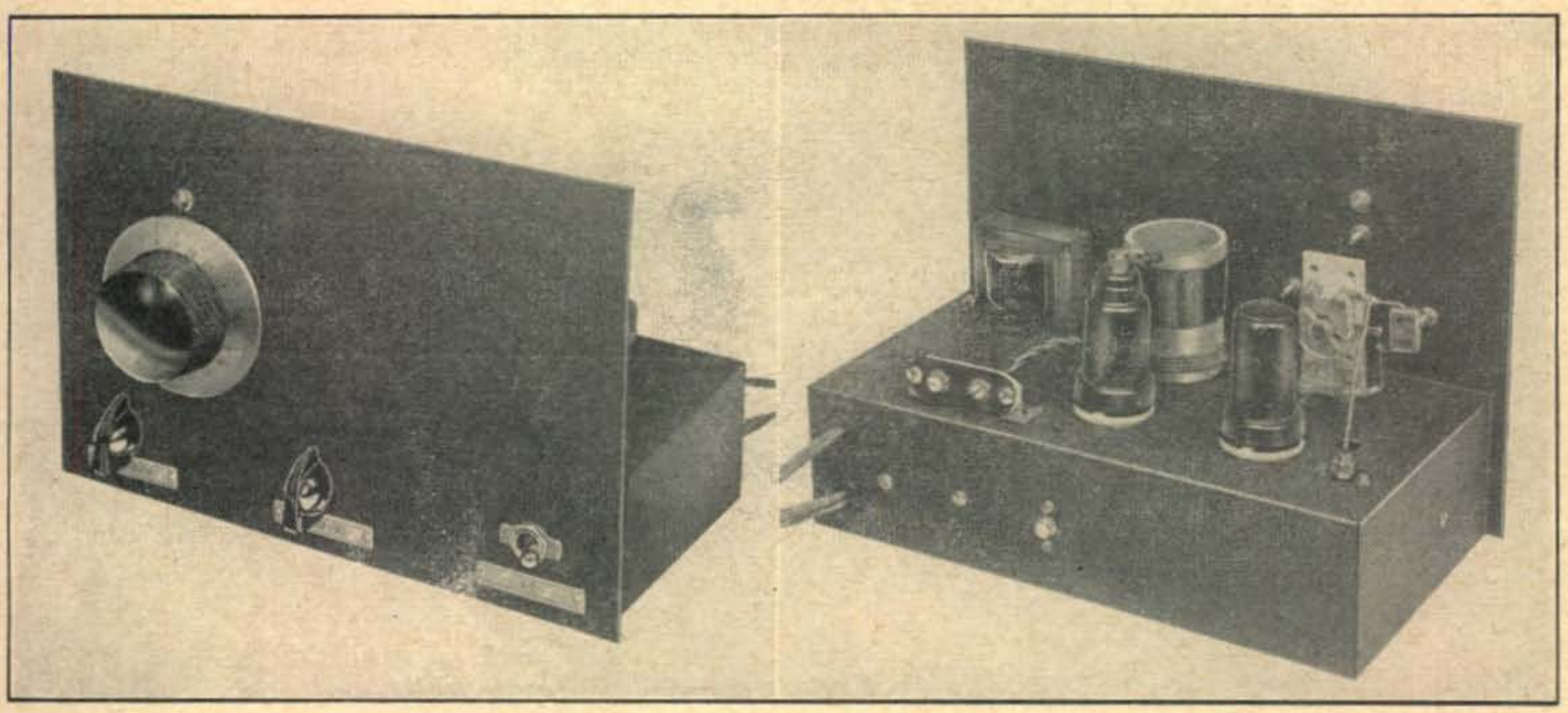
This switch in the center-tapped windings of the power transformers provides an easy and rapid



means of transmitter-receiver control. Use one of the large switches that has a neutral, or center position, which can be used for a standby position.

A. E. Osorio, LU2AO

S & W is a department for the ham gadgeteers and workshop experts. All readers are invited to pass along ideas. Don't worry about literary form—just get your ideas down on paper and include rough sketches, diagrams or photos if you have them. Be sure to give your name, call and QTH. Send as many items as you choose and for each one published we will send along two crisp new dollars. Address all contributions to S & W Department, CQ, 342 Madison Ave., N. Y. 17, N. Y.



Left: Front panel view of 160-meter converter. Controls are for tuning, regeneration, and the mixer trimmer.
Right: Rear view of the converter.

A Simple Converter for 160

GERALD W. LOOMIS, W1PAD,* and CHARLES E. LILLIE, W1JTG*

160 meters back and no way to listen! It's a common dilemma, but this converter, designed for use with any receiver capable of tuning 4.1 mc, will solve the problem with high-performance coverage.

WITH THE REOPENING of the 160-meter band already a fact, it is high time to consider equipment for operation at these frequencies. Many of the postwar amateur stations are without even the most basic equipment capable of operation on 160. In setting up for 160-meter operation logically the receiver comes first. Many war surplus and amateur models tune no lower than 2.4 megacycles, but a relatively simple converter with 4.1-mc output will extend their range to cover 160 in excellent style. After worrying about every inch of lead length on 2 and 6 meters, it is a distinct pleasure to build a piece of low frequency gear for a change in which one inch represents less than .0002 of a wavelength!

Simplicity plus performance were the major considerations in designing this unit. It had to be simple enough for even the most inexperienced amateur to build, and yet it should perform in a manner to suit the old-timer. The cost of parts was also to be held at a minimum. A glance at the illustrations and schematic diagram will prove we've kept our bargain as regards simplicity. As for performance, build it and see for yourself!

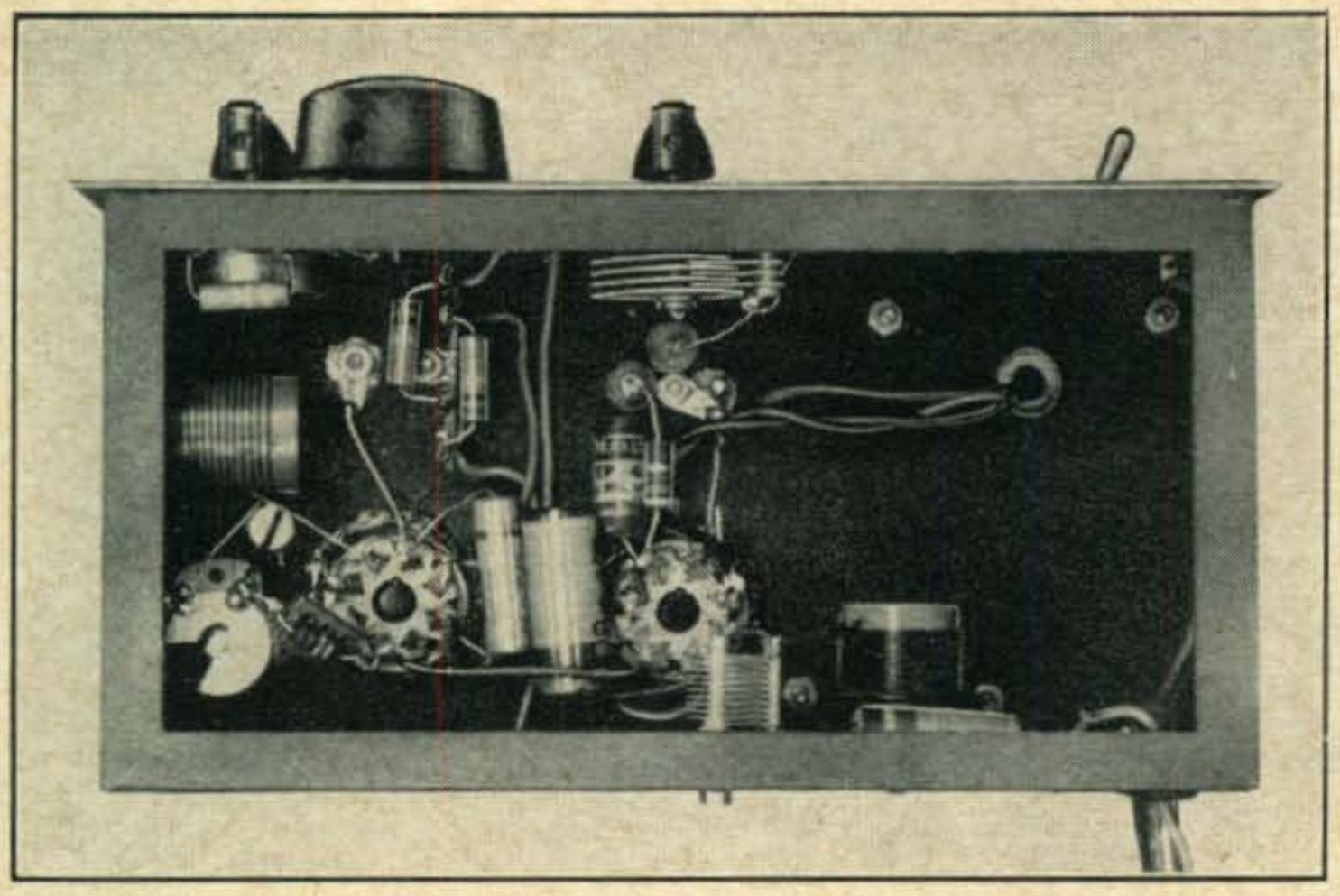
Circuit Details

As shown in the schematic, the converter comprises a 6L7 regenerative mixer and a 6C5 local oscillator. A regenerative mixer was chosen as a means of approximating the sensitivity and selectivity of an additional r-f stage without adding another tube and tuned circuit. Regeneration is accomplished by returning the mixer cathode to a point on the grid coil slightly above ground. Regeneration is smoothly controlled by varying the d-c screen voltage of the mixer by means of a front panel potentiometer connected in a voltage divider circuit. A high *L-C* ratio is purposely used in the mixer grid circuit to make this circuit broadly resonant. Hence the necessity for gang tuning of mixer and oscillator with resultant tracking problems is eliminated. The center knob on the panel is the mixer peaking condenser which permits this circuit to be trimmed up as necessary.

The local oscillator employs a 6C5 tube in a conventional Hartley circuit. Oscillator voltage is injected at the No. 3 grid of the mixer. The oscillator is tuned from 5.9 to 6.1 mc by the main tuning dial, and the 1.8 to 2.0-mc received signals beat against this voltage to provide 4.1-mc converter output.

Heater voltage is supplied by a filament transformer in the converter. Since the plate current drain is less than 20 ma, it will generally be found convenient to take plate power directly from the receiver. However, room has been left on the

*% *Raytheon Mfg. Co., Waltham, Mass.*



Underside of converter showing parts placement and wiring details. This is one band where lead length is definitely not critical.

chassis to include a simple a.c.-d.c. power supply such as the one described in the last paragraph of this article.

Chassis Layout

The placement of parts in this unit is not particularly critical. However, the inexperienced constructor would do well to follow the layout shown in the illustrations as closely as possible. The chassis used measures 9½" x 5" x 2½", and the front panel is 10" x 7". All holes should be drilled before mounting any parts, and any scratches made when drilling may then be touched up with enamel.

The two tube sockets, the antenna terminal strip, the filament transformer, mixer grid coil, and oscillator tuning condenser appear on the top of the chassis, shown in the photo. The adjustable oscillator padder, *C7*, also appears just to the right of the 6C5 tube. Note also the 100-μμf fixed mica padder, *C8*, which is soldered directly across *C6*. At the rear of the chassis are two grommeted holes for the a-c line and the receiver connections respectively.

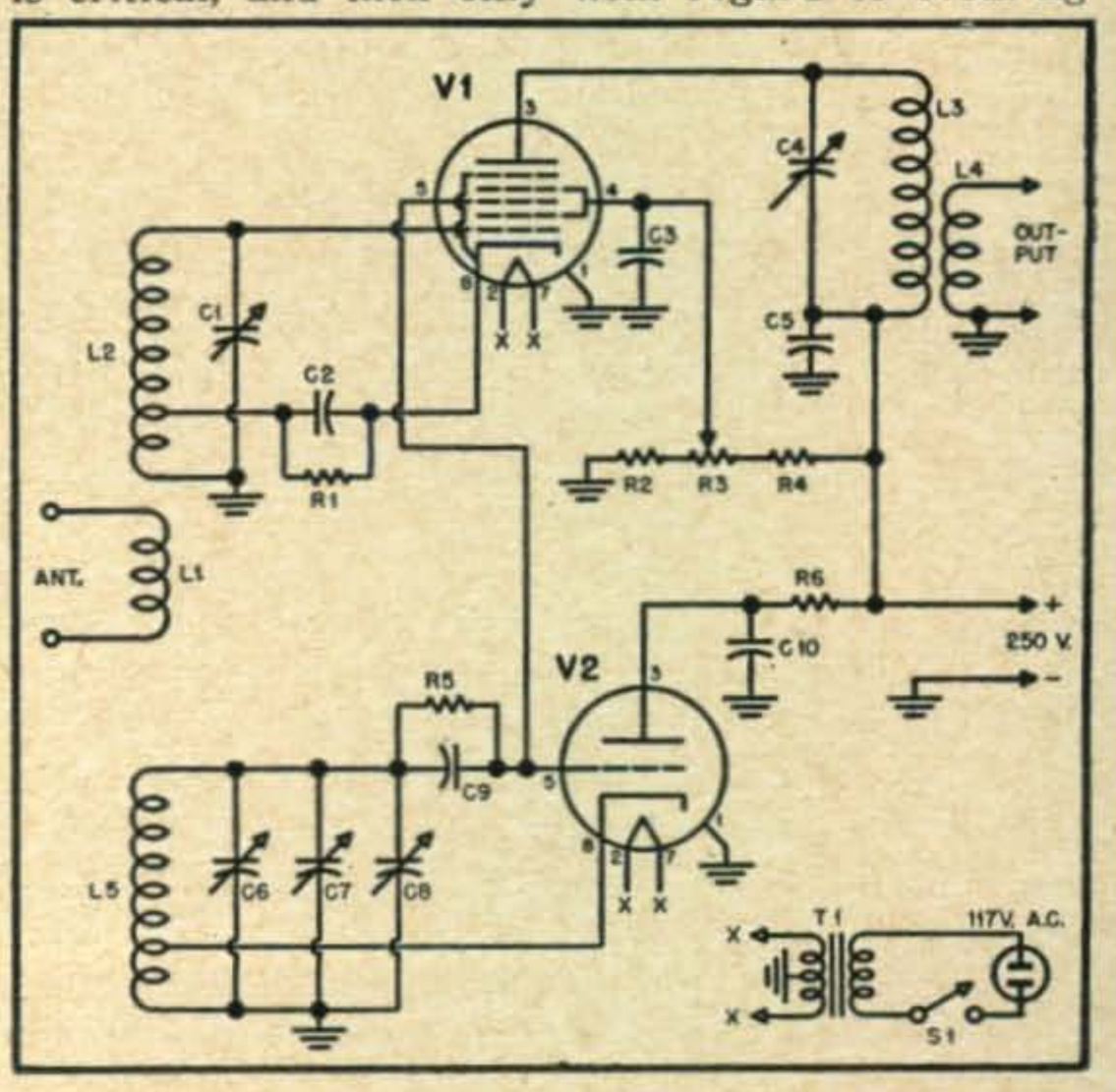
At the front of the chassis drill three evenly spaced holes for the regeneration potentiometer *R3*, the mixer trimmer condenser, *C1*, and the a-c switch (see *Fig. 1*). Matching holes must also be drilled in the panel, together with a hole for the shaft of *C6*.

The terminal strip for *R4* and *R6* and a ground lug are mounted on the two bolts securing the tuning condenser above the deck. Three ⅜" holes are drilled directly behind *C1* to accommodate the three pins of *L2* (see coil winding instructions below), and a center hole serves to mount the coil form and also provides an additional ground point. Another 4-lug terminal strip, not visible in the illustration, mounts on the rear of the chassis near the two grommet holes to take the converter output leads. Placement of the remaining holes should be obvious from the illustration.

The method of mounting most parts should be quite clear from the foregoing text and illustrations. Some variation in parts placement may be necessary to take care of your own components if widely different in size from those in the model. However, this is 160 not 2 meters, so don't worry about it! The oscillator tuning condenser, *C6*, alone is critical, and then only with regard to securing

Fig. 1. Schematic of the 160-meter converter.

C1—50 μμf, midget variable.
C2, C5, C10—.01 μf, paper.
C3—.1 μf, paper.
C4, C7—10-100 μμf, air trimmer (Hammarlund APC-100).
C6—1.5-15 μμf, variable (National UM-15, see text).
C8, C9—100 μμf, mica.
R1—470 ohms, 1 w.
R2—25,000 ohms, 1 w.
R3—25,000 ohms, linear taper potentiometer.
R4—50,000 ohms, 1 w.
R5—50,000 ohms, ½ w.
R6—50,000 ohms, 1 w.
S1—SPST a-c switch.
T1—6.3 v.a.c., 1 a. fil. trans.
L1—4 turns #18 hookup wire at bottom of L2 (see text).
L2—15/16" solid winding of #28E on 1½" form tapped 1½ turns from bottom.
L3—37 turns #22E close wound on 1" form.
L4—6 turns #18 hookup wire wound over lower end of L3.
L5—16 turns #22E spaced over 1½" on 1" form and tapped 4 turns from bottom.
V1—6L7 tube.
V2—6C5 tube.



the proper degree of bandspread. A National UM-15 condenser is used here with one rotor and one stator plate removed to spread the band over approximately 90 dial divisions. Bend the two plates back and forth a few times, and they will soon pull out.

Coil Winding

Specifications for the various coils are given in the parts list. *L1* and *L2* are wound on a standard 1½" 5-prong plug-in type form. Before making these two windings, clip pins *1* and *5* from the form leaving the three widely spaced base pins on the form for connections to the windings. Three chassis holes are drilled as explained in the previous paragraph to clear these three coil form pins, and you have provided for three simple feed-through connections. Now drill a mounting hole through the center of the coil-form base, and a corresponding hole through the chassis. Winding *L2* is close wound at the top of the form and tapped 1½ turns from the bottom end. Winding *L1* consists of 4 turns of No. 18 hookup wire with a fairly stiff insulation and is close wound in the form of a link. After winding, slip it off the

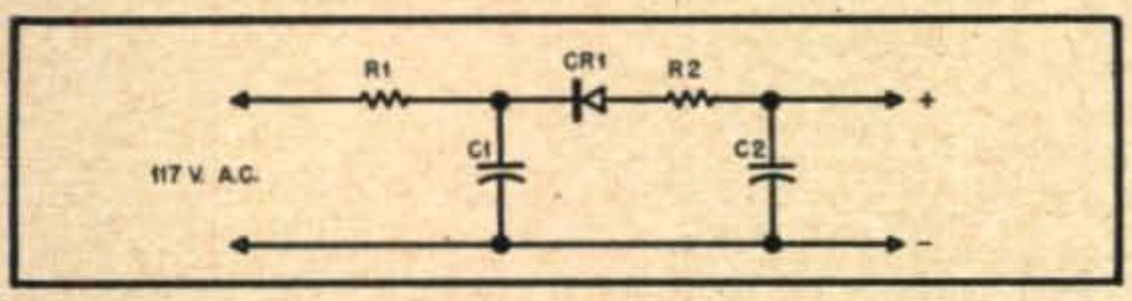


Fig. 2. Diagram of a.c.-d.c. power supply.

C1—20 μf, 250 v., electrolytic.
C2—40 μf, 150 v., electrolytic.
R1—50 ohms, 1 w.
R2—1000 ohms, 1 w.
CR1—selenium rectifier, 100 ma.

form, wrap it in several places with scotch tape to form a self-supporting coil, and slip it back over the form spaced ½" from the bottom end of *L2*. You should now have a close-fitting semi-adjustable antenna coil. Be sure to leave twisted leads long enough to reach the antenna binding posts.

L3, *L4* and *L5* are wound on standard 1" forms drilled at the bottom for a mounting bolt. Note that *L4* is a 6-turn pickup coil wound directly over *L3*. *L4* may also be strengthened with scotch tape as was done in the case of *L1*. Its leads are brought to the output terminal strip on the rear of the chassis. The leads from the *L3* and *L5* windings are secured directly to holes in the coil forms and then used for circuit connections.

Wiring

No special precautions are necssary in wiring the converter other than making sure all joints are tight. Notice that three leads are brought out for connection to the receiver. These are B+ 250 volts, B- (ground), and output signal. The output signal lead is actually a length of shielded wire with the shield connected to the low side of *L4* (ground), and the inner conductor to the high (plate) side.

(*Continued on page 92*)

MARS Activities

A continuing study is made by the Chiefs, MARS, concerning the manner in which preferences of activities are listed by members of MARS which serves as an accurate guide for forthcoming projects and to keep the broader concept of MARS constantly in front of them.

There is nothing radical revealed by the survey. It is reassuring to find that the handling of traffic has not slipped into a minor position or that amateurs as a whole are content to have only a "store-bought" installation.

The following data was compiled from membership applications of more than 400 members.

Forty-four per cent of MARS members put traffic handling above all other interests. Thirty per cent list it as second choice and 16% as third choice, showing that traffic handling is something in the lives of 90% of MARS members.

Eighty-seven per cent of the membership is intrigued by design and construction. 46% put their love to build gadgets and gismos above all others, while 34% are willing to put off building while they do something else, and seven per cent would be building if it were not for two other electronic distractions.

The third category of interest is u.h.f. with 5 per cent of all MARS members indicating that they would rather be probing 400 megacycles and above than watching Howdy Doody on a 16-inch TV set. Sixteen per cent would be fondling Klystrons if it were not for traffic and 23% will yield u.h.f. only to two other MARS activities.

If the critics wished to view something with alarm, it is the lack of interest in antennas. Only three per cent listed antennas as their primary interest, although 15% put skywires as their secondary avocation and 18% listed Marconi's and Hertz's contributions to communications as third interest or lower. That leaves 64% of MARS members putting antennas in fourth place or lower.

Since the Chiefs, MARS, are perhaps overly antenna conscious, in the first issue of the MARS bulletin, due to be distributed in May, 1949, the lead article will be devoted to antennas, and a continuing emphasis will be placed on skywires in an effort to interest this 64% in using something besides a wet string or a barbed wire fence for a radiator.

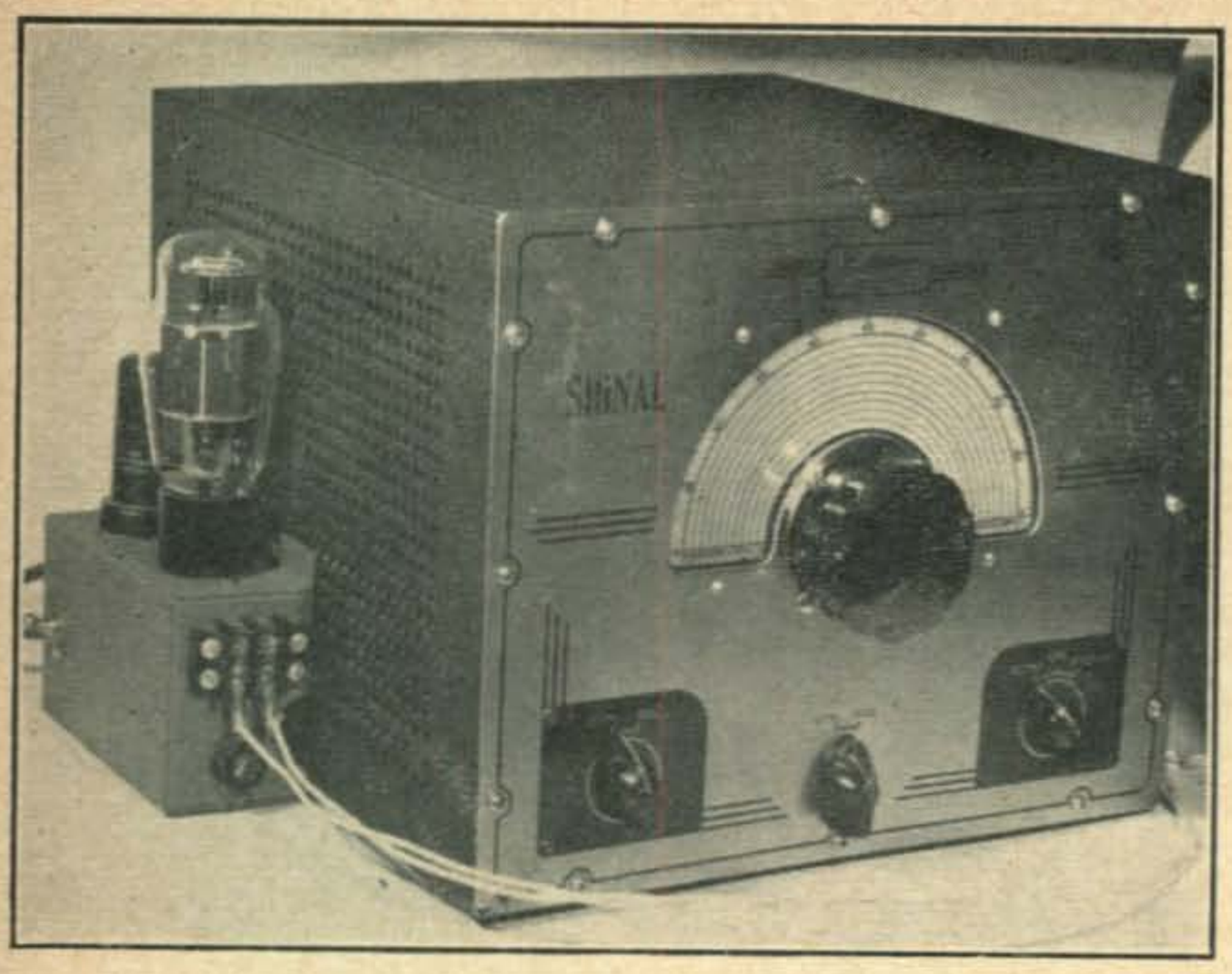
The percentage of those interested in television follows in a happy sequence, perhaps prompted by TVI. (hi!) The figures show four per cent can't get along without it while another 27% are interested in varying degrees.

The SCR-270 and 271, the APQ-13, the Tipsy Two, and other ground and air-borne radar sets left their mark on almost a fifth of the MARS membership. Three per cent placed radar as first preference, six per cent as second choice and 10% as third interest.

Guided missiles have an enduring fascination for two per cent of MARS members, another four per cent place them as second interest and 10% are definitely intrigued with their possibilities.

Facsimile was the lowest man on the totem pole. This was not surprising since there was less fax equipment in the field than any other type of electronic gear, consequently fewer amateurs

(*Continued on page 83*)



The keyer is small enough to be mounted in a convenient location.

6AS7 Vacuum Tube Keyer

E. H. MARRINER, W6BLZ*

The versatile 6AS7 provides another answer to click-free keying.

THERE ARE MANY types of vacuum tube keyers, each apparently designed for some particular application. While this unit was built to operate with an older style Meissner Signal Shifter, it is of such simple design it can be used to key almost any oscillator or low power transmitter through the cathode circuit.

Experiments by the writer with simple *RC* and *LC* filter arrangements did not entirely clear up cases of key clicks heard in the household receiver. Screen grid keying with VR tubes was workable as long as only the final amplifier was keyed. In keying the buffer and doubler enough signal leaked through to start the final off.

A possible solution appeared in the vacuum tube keyer described by W6EAK using a 117L7GT.[1] It was found that in this particular case the internal resistance of the tube was so high that it reduced the output of the Signal Shifter to a point where it was incapable of driving the buffer stage. This started a search for a triode with lower internal resistance. The types 45 and 2A3 were considered. About this time the 6AS7 double-triode was announced. This tube when operated with both sections in parallel and zero bias has a resistance of only 140 ohms and will pass 250 ma.

The keyer shown in the schematic *Fig. 1* was built around this tube. Mechanically, it can be made quite small, while electrically it is simple to build and to operate.

The bias voltage for the keyer is obtained from line rectification using a 6X5, or the miniature 6X4. A 3-ampere fuse is inserted in the hot side of the a-c line in case the plug is not polarized. Needless to say, if the fuse blows take out the plug and turn it over, replace the fuse and reinsert the a-c plug. It's best to mark this position once it is found.[2] Note also, that the 30-μf electrolytic condenser in the output of the rectifier is connected with the *positive* terminal to ground. The 100-ohm resistor to have more than adequate safety factor, should be about ten watts in this circuit.

Circuit Operation

With the a-c power connected and the key up, the 6AS7 is biased to cutoff and no current flows through the tube, thus the cathode of the Signal Shifter is open-circuited. Closing the key shorts out the bias voltage and the tube conducts. However, at the closing of the key there is a delay introduced equivalent to the time constant of the .001-μf condenser and the 470,000-ohm resistor in the grid circuit of the 6AS7. This time constant is about 4.7 X 10^{-4} seconds and is shown as a waveform on an exaggerated time scale at the top left of *Fig. 2.*

On the break, or opening of the key, we have a growth time of about 2.7 X 10^{-3} seconds introduced by the 2.2-megohm resistor, the 470-000-

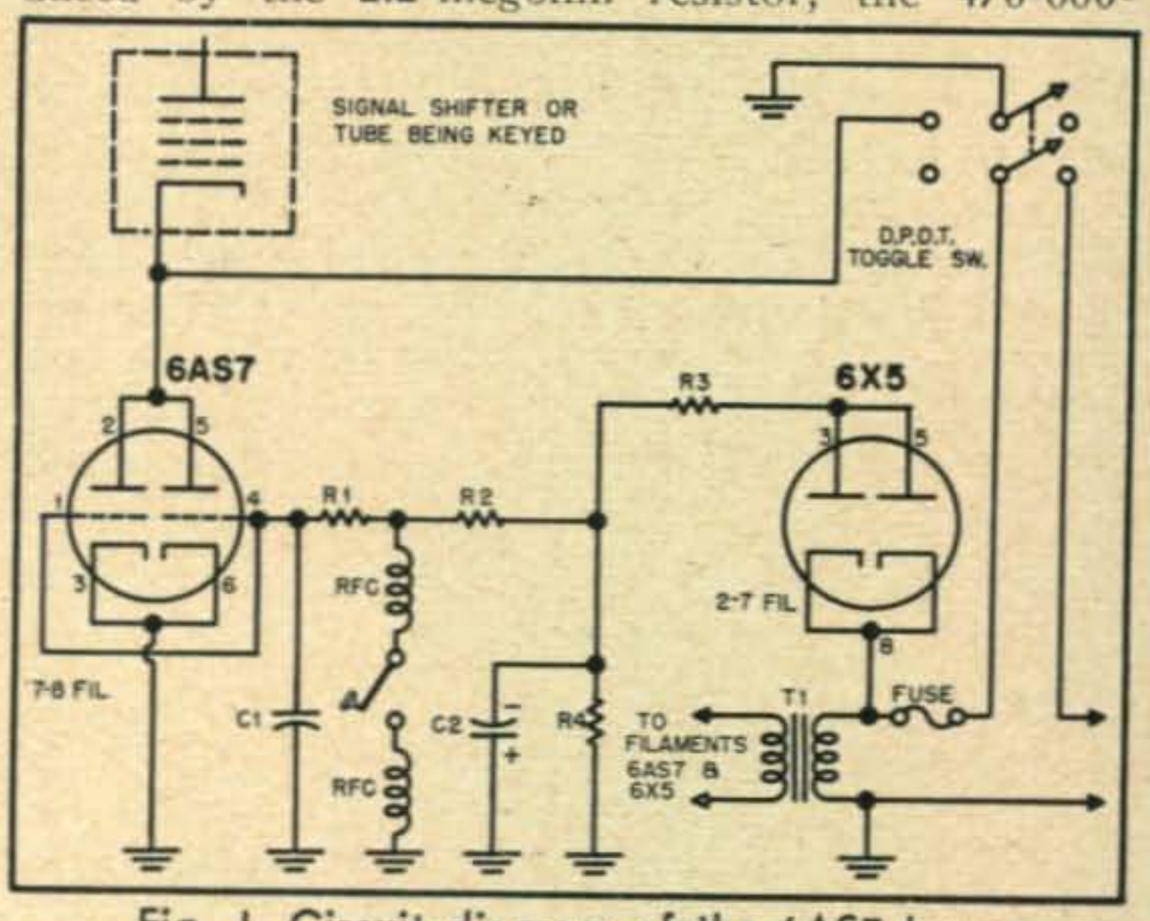


Fig. 1. Circuit diagram of the 6AS7 keyer.

C1—.001 μf.
C2—30 μf, electrolytic
R1—470,000 ohms, 1 w.
R2—2.2 meg., 1 w.
R3—100 ohms, 10 w.
R4—100,000 ohms, 1 w.
RFC—2.5 mhy.
T1—6.3 v., 3 amp., fil. transformer.
Fuse—3 amp.

*528 Colima St., La Jolla, Calif.

1"A Compact Keyer," Matthews, *CQ*, January, 1947, page 25.

2This is of course written with the idea that all transmitting equipment is grounded, as it should be. It is surprising to find how much equipment is operated in amateur stations in an ungrounded condition. Using this type keyer at such stations would be dangerous, *Ed.*

ohm resistor and the .001-μf condenser. This waveform is shown at the right top of *Fig. 2*. Both of these curves are upside down since this is the voltage variation as it appears at the grid of the 6AS7. The waveform of the voltage appearing from the cathode of the Signal Shifter to ground would be a combination of these two patterns possessing fairly steep sides and rounded corners.

The chokes in the key leads are of the small pi wound 2.5-mh variety. They are inserted in each lead right at the key to prevent r-f radiation from the lead. Actually, there is very little current in the key circuit and these may not be needed, but speaking from past experience, many key clicks heard on nearby a.c.-d.c. broadcast sets were caused by minute keying sparks. These chokes do not affect the time constant of the *RC* circuit, because of their low inductance.[3]

To use this keyer with the older style Meissner Signal Shifter the plate of the 6AS7 is connected to the tip of an earphone type plug while the chassis of the keyer is grounded. This plug is inserted in the jack at the rear of the Signal Shifter. Terminals *2-3* and *4-5* are shorted, respectively. The author has been well pleased with the operation of this keyer as the characters are always clean cut and no clicks or thumps can be heard.[4]

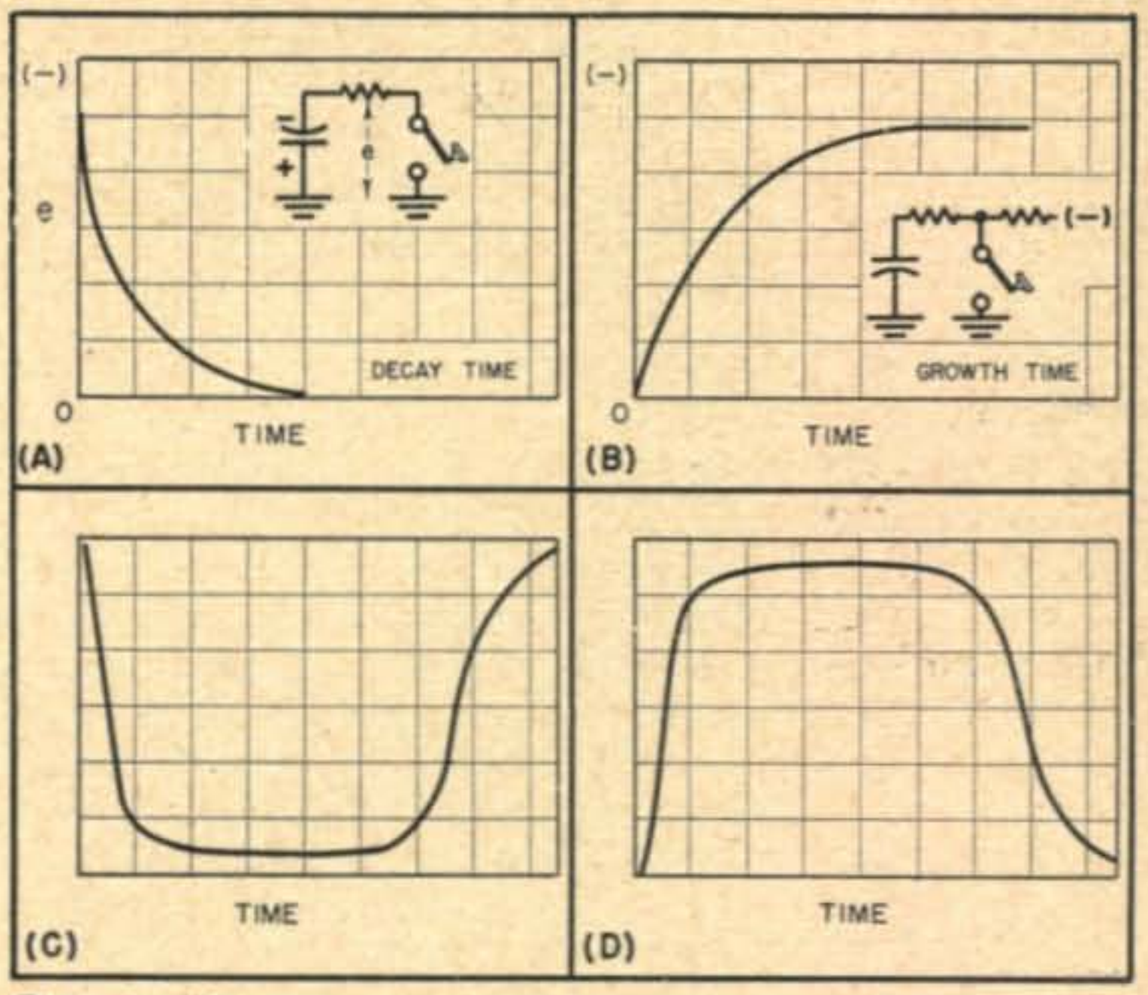


Fig. 2. Keying waveforms resulting from shaping in the 6AS7 grid circuit. Note the absence of sharp corners or abrupt changes in shape of wave.

3Remembering that the product of R_1 and C_1 determines the time constant at the make and the sum of R_1 and R_2 times C_1 the time constant at the break, the keying wave can be shaped to the individual taste. *Ed.*

4The **mu** of the 6AS7 is two. Therefore the grid bias required for cut off is half the open circuit voltage that appears across the keying terminals. The half wave power supply shown by the author will provide approximately 140 v.d.c., hence the maximum voltage that can be keyed is 340 volts. If it is desired to key a higher potential a voltage doubler or a transformer supply is suggested. However, the maximum plate-cathode voltage rating for the 6AS7 is 250 v. although an "amateur" safe rating in this service is of the order of 400 volts maximum.

Postscripts

Texas Convention

The annual convention of the South Texas Emergency Net will be held in Cuero, Texas, May 28-29. On Saturday, May 28, there will be a special mobile contest on the way to the convention, beginning at 7 a.m. Registration will begin at the Legion Hall in Cuero at 9 a.m. and programs will begin at 1 p.m. On both days there will be good entertainment as well as technical information interspersed with lively contests and prize drawings. The YLs and XYLs will enjoy special programs arranged for them. The FCC inspector will be there and those who wish to take the examination for their amateur license may do so on Saturday. The highlight Sunday will be the barbecue at noon in the city park. Tickets may be obtained in advance from B. B. Thorn, W5CIX, Cuero, Texas, price $2.50 each.

●

Westchester N. Y. Hamfest

The Westchester Amateur Radio Assn. will hold its annual hamfest and dinner on Friday, May 6, at 7:30 p.m. at the Scarsdale Casino, Central Ave., Scarsdale, N. Y. There will be prizes for YLs and OMs. See David Bulkley, W2QUJ, 405 Weaver St., Larchmont, N. Y., or c/o International Tel. and Tel., 67 Broad St., N. Y. C., for tickets. Price $3.50 per person, or $3.75 at the door.

Arizona Field Day

The radio clubs of Arizona are sponsoring the state's first statewide Field Day Contest. Amateur stations outside of the State of Arizona are invited to participate, with a certificate to be presented to the station submitting the highest score in each call area. The contest will run from 2-12 p.m. May 14, and 7 a.m. to 3 p.m. May 15, Mountain Standard Time. Either phone or c.w. may be used. Two points will be counted for each Arizona station contacted, and the same station may be worked for full credit on different bands. Each Arizona Field Day station contacted will count as a multiplier. Total score will be arrived at by multiplying the number of stations contacted by two, and by multiplying that score by the number of Arizona Field Day stations contacted. Home stations in Arizona may not be used as multipliers. To enter the contest watch for W7 stations calling CQ Ariz, or call CQ Ariz. Scores should be mailed to Gladden Elliott, SCM, 39 North Melwood, Tucson, Ariz., not later than June 1, 1949.

●

Feedback

In the article "Versatile Single-Sideband Exciter," by Donald E. Norgaard, in the March and April, 1949, issues of *CQ*, resistor R134 should be 56,000 ohms, ½ watt, Allen Bradley or equivalent.

Monthly DX Predictions - May

OLIVER PERRY FERRELL*

80 Meters

As the sunspot cycle wanes, it is to be expected that more accent will be placed upon DX on 20 and 40 meters, as well as 80 meters. Predictions at 4 mc can be made, but are not as accurate as those at high frequencies. However, beginning next fall the DX Predictions will also include forecasts of 80-meter conditions. These will be based upon the improved techniques of medium frequency prediction and will indicate the most likely hours for band openings.

Parameters

In answer to several questions, to forecast DX conditions a system of arbitrary parameters must be established. For the amateur bands we have assigned them as follows;

A. 1000 watts effective radiated power. (P′)
B. Antenna gain factor is 1. (G)
C. Noise discrimination factor is 1. (Z)
D. Service gain factor is 14 db. (T)
E. Direct or shortest route used.

The formula combining these factors is

$$P' = P_o T Z G$$

where P_o is the total radiated power

It is noteworthy, that P′ is not the actual power in the antenna, but depends upon the gain (G) of the antenna and noise discrimination (Z). Thus, P_o may be considerably lower than 1000 watts in actual practice, if G is made greater than 1. Also, over certain paths the horizontal pattern of a directive antenna will discriminate against one or more of the high atmospheric noise sources. Values of from 2 to 5 in both G and Z are not uncommon in amateur radio. Factor T is preset and is mentioned in the prediction abstract.[1]

West Coast to South Africa

40 meters: Absorption level drops down after 1645 PST. They will hear our signals first, but band should be fairly good from 1845 to 2100 PST. However, only those Americans radiating more than 500 watts effective will break through their high noise level. *20 meters*: c.w. gets through after 1430 PST, phones after 1615 PST. Band closes gradually around 1830 PST. Reopens with strong signals 2130 PST although phones probably not too good on their end. Band closes down finally just after midnight. *10 meters*: Possibly a few scattered signals several times during the month around 1000 to 1200 PST. Not dependable.

West Coast to Europe

40 meters: Considerable absorption across the polar regions. They may hear signals between 1845 and 2015 PST. Noise level should be too high on this end for consistent or predictable work. *20 meters*: c.w. comes out of the noise around 1345 PST. A few phones may break through on ionospherically quiet days between 1630 and 1800 PST when, the band fades out. Erratic reopening though sometimes with very strong signals 2045 to 2230 PST. *10 meters*: No openings predictable. MUF about 19.0 mc.

West Coast to Middle East

40 meters: Direct route travels too long in the polar regions. No openings predictable, although some signals may break through erratically around 1900 PST. *20 meters*: On quiet days, c.w. from 1500 to 2145 PST. Phones from 1745 to 2030 PST. Conditions generally poor. *10 meters*: No openings predictable. MUF about 19.0 mc.

West Coast to Australasia

40 meters: Consistent openings from 2215 PST to 0630 PST the following morning. *20 meters*: c.w. after 2045 PST, phones after 2145 PST. Band closes down suddenly around 0430 PST. Peak conditions 0100 to 0400 PST. *10 meters*: A fairly regular opening starting around noon. Signal strengths improve after 1700 PST. Peak conditions 1800 to about 2145 PST.

West Coast to Southeast Asia

40 meters: Band should open suddenly around 0230 PST. Signals good in both directions until 0545 or 0615 PST. Peak conditions based on the atmospheric noise should be 0300 to 0430 PST. *20 meters*: c.w. comes out of the noise after midnight. Phones gradually build up and become readable around 0200 PST. Peak conditions 0430 to 0730 PST. C.W. goes out around 0930 PST. *10 meters*: No openings predictable, although band may open sporadically for short periods in the late afternoon.

West Coast to South America

40 meters: Consistent opening from about 1800 to 0300 PST the following morning. Signals fair, but atmospheric noise level is high. *20 meters*: c.w. after 1445 PST, then phones after 1645 PST. Good strengths from 2000 PST until 0100 PST. Band may close down erratically around 0200 PST for about one hour. Reopens (?) 0300 to 0530 PST with fair signal strengths. *10 meters*: Generally consistent opening from about 0800 to 1630 PST. Peak conditions after 1300 PST until closing.

Midwest to Equatorial Africa

40 meters: Opens around 1700 CST, then builds up rapidly with fair signals from 1945 to 2200 CST. Closes down after 2315 CST. *20 meters*: First c-w signals audible after 1400 CST. Phones readable after 1715 CST until 2300 CST. C.W. goes out around 0115 CST the following morning. Conditions should be fair to good. *10 meters*: No openings predictable. MUF about 23.5 mc.

(*Continued on page 82*)

**Assistant Editor, CQ.*

1 The method of making DX predictions is described in the National Bureau of Standards Circular 462. Values of MUF were obtained from "Basic Radio Propagation Predictions for May, 1949" (CRPL Series D-54). Both of these publications are available from the Superintendent of Documents, Government Printing Office, Washington 25, D.C.

Conducted by HERB BECKER, W6QD*

1948 DX Marathon Results

BELOW ARE THE FINAL standings of the 1948 DX Marathon. The winner in each zone will receive a very fine certificate in recognition of his achievement. We are likewise awarding certificates, noting their positions, to those in second and third places. Certificates of participation will go to all other stations entered in the Marathon. As you can see, participation in the C.W.-Phone section was much greater than in the Phone-only section. I would like to congratulate all of the participants in this DX Marathon, and I think you will agree, after looking at some of these totals, it represents a terrific amount of DX worked in a year's time.

W. A. Z.

This month we are awarding W.A.Z. certificates to the following seven DX men. Congratulations, fellows!

107	LU6DJX	Alfredo E. Luciano	40	188
108	ZL2GX	J. M. White	40	175
109	W6GDJ	A. L. Hullin	40	167
110	W6LRU	Don Stansifer	40	141
111	W6RLN	K. C. Jones	40	148
112	W2AQW	H. J. Siegel	40	208
113	W6DLY	Guy M. Martin	40	146

We all know of LU6DJX, and to him goes the honor of being the first LU station to achieve W.A.Z. Alfredo has been in this DX business a long time, and we are glad to welcome him into the 40 Zoners. ZL2GX had no sooner said it would probably be a long time before he would make his postwar W.A.Z., since the Russians don't seem to want to oblige, when in popped a card from UI8KAA. Nice going, Jock. We're glad to see W6GDJ make the grade. His home town, Sacramento, has always been particularly low on DX activity, but this definitely proves it can be done.

Send all contributions to Herb Becker, 1406 South Grand Ave., Los Angeles 15, Calif.

1948 DX MARATHON RESULTS

C. W.-PHONE

Zone 1

KL7KV	38	76
KL7KI	19	31
VE8AS	14	18
KL7CZ	12	12

Zone 2

VO6EP	38	134
VO6J	15	38

Zone 3

W6ENV	40	189
W6PFD	40	188
W6SN	40	187
W6ITA	40	179
W6NNV	40	165
W6KRI	40	161
W6AM	40	159
W6RM	40	157
W6OMC	40	154
VE7ZM	40	153
W6GAL	40	151
W6PQT	40	147
W6UCX	40	140
W6SRU	40	135
W6UZX	40	129
W6WKU	40	121
W6LRU	40	120
W6HZT	40	115
W6FSJ	40	92
W6ANN	39	109
W6QD	39	97
W6LN	39	82
W6WWQ	38	81
W6MUF	37	80
W6MI	36	83
W6CTL	35	96
W6OEG	35	80
W6KYV	34	82
W6BIL	33	69
W6QWL	32	83
W6ZE	32	79

C. W.-PHONE

W6LER	32	53
W6MXN	30	72
W6EYC	30	60
W7PK	27	62
W6CID	27	39
W6VAT	26	52
W6OKL	24	55
W6AGT	24	44
W6MGZ	23	29
W6HJ	19	25
W6MIO	19	22
W6UXF	17	18

Zone 4

WØYXO	40	178
W9NDA	40	175
W9VW	40	169
W8EWS	40	160
W9IU	39	177
W9LM	39	161
W5ASG	39	152
W9LNM	39	138
W8SDR	39	132
WØEYR	39	129
WØGKS	39	123
W9GA	39	106
VE3QD	36	132
W9CIA	36	124
WØDU	36	124
W9TB	36	89
W4HA	35	120
W8GLK	34	108
W8KPL	33	98
WØSBE	33	95
WØWCE	32	99
WØCFB	32	90
W5ZD	30	88
WØCMH	30	48
W5CPI	29	75
WØAZT	29	60
W5EWZ	29	51

C. W.-PHONE

W8NQR	28	57
W8MBZ	28	49
WØUOX	27	57
W8BF	25	68
W5JPC	25	49
W9EHS	24	56
W8LFE	23	38
W8MKU	21	46
W9KMN	15	13

Zone 5

W1ENE	39	165
W1NMP*	39	162
W3DPA*	39	162
W3DRD	39	142
W1BIH	39	140
W1AB	39	121
W1JYH	38	153
W3EPV	38	125
W3OCU	37	151
W3IYE	37	120
W1AWX	36	104
W2EMW	35	127
W2TJF	35	125
W1BFT	35	111
W3WU	34	109
W2AW	34	106
W2RGV	34	101
W4LVV	33	119
VE2WW	33	87
W2MEL	33	87
W3NOH	32	108
W2PQJ	32	91
W2OM	30	69
W1MRP	30	82
W8JN	29	68
W4JUJ	28	64
W3AQT	28	59
W4TO	27	95

* Tied for second, Zone 5

C. W.-PHONE

W2BF	27	72
W1CJH	26	66
W4CY	26	59
W4ALJ	26	52
W3RJS	25	52
W2IOP	23	47
W2PUD	23	40
W4LK	21	46
W1HJ	21	44
W1QCJ	21	38
W3NPZ	18	41
W4BRB	16	36
W4HKJ	13	21

Zone 7

TG9JK	33	90

Zone 8

KP4HU	39	149
KP4AD	28	65
KP4KD	21	48

Zone 10

OA4AK	36	116

Zone 11

PY1DH	39	156

Zone 12

CE3AG	39	140
CE7AA	35	33

Zone 14

F8BS	40	166
G3DO	39	128
ON4MS	35	76
EA5BE	29	73

Zone 20

SV1RX	39	129

Zone 24

C1CH	36	77

Zone 25

J2AHI	18	35

Zone 27

KG6AI	28	51

C. W.-PHONE

Zone 30

VK2DI	40	158

Zone 31

KH6IJ	39	128
KH6PY	39	106
KH6LF	38	110
KH6NB	36	72

Zone 32

ZL1HY	40	145
ZL2GX	35	125
ZL1QW	27	57

Zone 36

FE8AB	33	87

Zone 37

VQ3HGE	39	122

Zone 38

ZS2X	39	146

PHONE

Zone 1

KL7DE	8	11

Zone 3

W7HTB	38	117
W6DI	37	142
W6CHV	34	101
W6PCK	32	105
W6PXH	31	100
W6ITA	31	90
W6AM	30	56
W6WUI	28	54

Zone 4

W9NDA	37	119
W9RBI	36	124
W8HUD	34	114
W4HA	33	112
W5ASG	32	99
W8NK	31	70
W5LWV	29	71
W9WCE	27	74
W5ERY	26	73
WØSBE	26	61

PHONE

VE3BBZ	24	52
W8LFE	16	23

Zone 5

W1ATE	37	118
W1JCX	36	139
W4ESP	36	118
W1NWO	35	131
W1FJN	33	97
W2IUV	33	80
W2RGV	31	76
W2DYR	29	78
W2PQJ	25	54
W1CJH	23	52
W1EQ	22	57
W2BF	20	44

Zone 6

XE1AC	34	135

Zone 7

TG9AD	22	35

Zone 8

KV4AD	27	55

Zone 10

OA4AK	30	70

Zone 13

CE3AB	33	108

Zone 14

G3DO	35	113
F8DC	28	47

Zone 24

C1CH	34	74

Zone 25

J2AHI	19	31

Zone 31

KH6NB	26	48

Zone 32

ZL2GX	26	64
ZL1QW	4	4

W. A. Z. HONOR ROLL

C. W.-PHONE			C. W.-PHONE			C. W.-PHONE			C. W.-PHONE			PHONE ONLY		
W6VFR	40	216	W6UZX	40	149	SM5WI	39	139	G4CP	37	117	W6VFR	39	146
W6EBG	40	210	W6RLN	40	148	G3FJ	39	139	VE1EA	37	116	W7HTB	39	143
W6ENV	40	209	OK1FF	40	148	WØEYR	39	137	WØAZT	37	112	VE7ZM	39	117
W2AQW	40	208	W6TS	40	147	W9VND	39	136	W6CTL	37	111			
W6ITA	40	207	W7DXZ	40	146	OK1CX	39	133	G4AR	37	108	W6DI	38	168
W2BXA	40	206	W6AYZ	40	146	G5RV	39	132	W8HSW	37	104	W4CYU	38	163
W8HGW	40	206	W6DLY	40	146	G2VD	39	132	G5MR	37	100			
G2PL	40	204	W9NRB	40	145	W9FKC	39	131	W2BLS	37	99	W1JCX	37	158
W3BES	40	204	W6MUC	40	145	VK4RC	39	131	G3AAE	37	99	W2BXA	37	150
W6ADP	40	204	W6QD	40	145	G2FSR	39	130	W2SGK	37	95	W8REU	37	146
W6PFD	40	203	W6LER	40	145	W8VLK	39	128	W7BTH	37	95	W8BF	37	146
W3GHD	40	202	ON4TA	40	144	OK1AW	39	128				W3JNN	37	136
W6SN	40	202	I1IR	40	144	WØUOX	39	126				G3DO	37	136
W6SAI	40	201	JA2KG	40	143	W6ID	39	125	W2RGV	36	136	W1HKK	37	136
G6ZO	40	200	W6LRU	40	141	VR5PL	39	124	OA4AK	36	128	G6LX	37	124
W6GRL	40	198	OK1LM	40	141	G5VU	39	124	W3AYS	36	124	G2AJ	37	121
W4CYU	40	194	W6CEM	40	136	G3AAK	39	122	W4DIA	36	121	F8VC	37	115
W3LOE	40	194	G3AZ	40	133	W6LGD	39	121	W2WC	36	119	C1CH	37	83
W6MEK	40	191	W6RDR	40	133	G5WM	39	120	SV1RX	36	119			
WØYXO	40	191	W6YZU	40	129	G8RL	39	120	MD5AK	36	118	XE1AC	36	153
W3EVW	40	190	W7GBW	40	127	W6RLQ	39	120	G2CNN	36	114	W1NWO	36	150
W6MJB	40	190	G5BJ	40	126	WØOUH	39	119	G2AKQ	36	112	W1MCW	36	147
VE7ZM	40	190	PK6HA	40	124	KH6PY	39	117	W2BF	36	108	W9RBI	36	140
W4BPD	40	189	W6NRQ	40	123	G6BS	39	117	W2JA	36	102	W2DYR	36	135
ZL1HY	40	189	W6MLY	40	123	W6NRZ	39	117	GM3CSM	36	102	W6WNH	36	132
W7GUI	40	189	W6LN	40	117	G3QD	39	116	W3FYS	36	101	W6PXH	36	131
LU6DJX	40	188	W6BIL	40	101	W7ETK	39	115	G2AO	36	100	W1FJN	36	128
W9KOK	40	186				G3TK	39	114	W5BK	36	99	G2PL	36	128
W6AMA	40	186				W6MI	39	113	WØRBA	36	99	GM2UU	36	127
W6MX	40	186	W2PEO	39	202	W6MUF	39	112	W5CD	36	97	G6BW	36	127
W6TT	40	186	W2HHF	39	199	W7GXA	39	105	W6BUD	36	96	W9HB	36	126
W2CZO	40	185	W2NSZ	39	194	KG6AL	39	104	G6WX	36	95	W4INL	36	125
W2IOP	40	185	W3KT	39	194	W6LEV	39	103	W7PK	36	91	W4ESP	36	123
W6DI	40	185	WØNUC	39	194	W7ENW	39	101	GM2AAT	36	75	G5YV	36	106
W6FSJ	40	185	PY1DH	39	194	W6WJX	39	101				G6WX	36	105
W6SA	40	184	W9IU	39	194	W6AX	39	93	W4DHZ	35	132	W3DHM	36	96
W6NNV	40	182	W2GWE	39	193	G6PJ	39	76	W8ZMC	35	131	W6SA	36	92
W6KRI	40	181	W2HZY	39	191				W4HA	35	131	F8DC	36	87
W6PKO	40	181	W3JNN	39	191				W2GVZ	35	125	W6PCK	35	115
ZS2X	40	181	W3DPA	39	191	VE3QD	38	174	W4LVV	35	124	W9CKP	35	114
VK2DI	40	181	W8NBK	39	190	W1JYH	38	173	VE3AAZ	35	123	G3FU	35	115
W6ZCY	40	180	F8BS	39	186	W2PUD	38	165	W9CKP	35	122	W6CHV	35	113
W6AM	40	180	W9ANT	39	185	W1ZL	38	160	W9WCE	35	120	W4OM	35	106
W6SC	40	180	W8RDZ	39	184	W3IYE	38	160	VE3ACS	35	117	W3PA	35	100
W6OMC	40	179	W2CWE	39	181	KP4KD	38	159	W8AVB	35	113	G8QX	35	100
W9VW	40	178	W1ENE	39	179	W2EMW	38	158	W9LI	35	112	VE3BNQ	35	92
W7DL	40	177	W1BIH	39	178	W3DKT	38	157	VE1PQ	35	111			
W7AMX	40	177	W3EPV	39	178	W8FJN	38	153	W6ZZ	35	109	W4HA	34	120
VE7HC	40	176	W9RBI	39	178	VO6EP	38	151	G8VR	35	100	W8ZMC	34	113
W6MVQ	40	175	W4INL	39	177	W4OM	38	149	W6EHV	35	98	W8BIQ	34	111
W6PB	40	175	W5ASG	39	177	W8CVU	38	141	W2HAZ	35	96	W2RGV	34	110
ZL2GX	40	175	W3JTC	39	176	W3KDP	38	141	G2AVP	35	89	W2GHV	34	103
W6PCS	40	174	W3DRD	39	175	W4VE	38	140	W8JM	35	86	W6AM	34	93
W6WKU	40	174	VK2ACX	39	172	TF3EA	38	135	D4ANM	35	80	W8QBF	34	92
W7FZA	40	174	W1NMP	39	169	W9FKH	38	133	G8RC	35	78	W2NXZ	34	65
W6RBQ	40	174	W2CYS	39	167	W4FPK	38	131	G3BDQ	35	74			
VE4RO	40	171	W4GG	39	166	G8IL	38	131	W7FNK	35	71	W9BZB	33	118
W6RM	40	171	W6SYG	39	166	G5CI	38	130				W5ASG	33	118
W6RW	40	171	W8LEC	39	166	W2PQJ	38	130				W2ZW	33	115
W6BAM	40	170	W4DKA	39	165	W3ZN	38	129	W4IYT	34	127	WØHX	33	103
W5AFX	40	169	CE3AG	39	164	G6LX	38	126	W9ENR	34	109	VE3ZM	33	100
W6AVM	40	169	W4BRB	39	162	W9MZP	38	126	G8QX	34	99	W5LWV	33	100
ON4JW	40	169	I1KN	39	160	W2BJ	38	124	G8KU	34	96	W2PQJ	33	100
W6ANN	40	167	G5DQ	39	160	GW3AX	38	123	WØFWW	34	93	W2DRH	33	60
W6GDJ	40	167	W9LM	39	159	W9TB	38	122	G6XX	34	89			
W6PQT	40	166	WØGKS	39	158	W8WWU	38	122	W8PCS	34	80	W9NRX	32	113
W6DUC	40	166	WØAIW	39	157	WØSQO	38	121	W6WUD	34	68	WØEYR	32	100
WØNTA	40	165	W9LNM	39	157	GW4CX	38	120	J4AAK	34	66	W9WCE	32	99
W6AQA	40	165	G8KP	39	156	W8KPL	38	117				W9MIR	32	99
W6UCX	40	163	W6IFW	39	154	W5CPI	38	113	W4QN	33	110	WØAIW	32	93
W6SRU	40	162	W6EAK	39	153	G3ZI	38	107	WØGBJ	33	89	W2HY	32	85
W6KUT	40	161	G6QB	39	152	W7EYS	38	107	WØFET	33	88	W2SVK	32	84
KH6IJ	40	161	W2RDK	39	152	G8IP	38	105	G2LC	33	85	W9GZK	32	72
W6DZZ	40	161	W8SDR	39	152	C1CH	38	84	W8QUS	33	85	W4LZM	31	93
W6IBD	40	161	G5YV	39	151	G3BI	38	75	G8VG	33	78	W4BA	31	90
LA7Y	40	159	G2AJ	39	151				G3BFC	33	77	W6UZX	31	85
G3DO	40	157	W6EPZ	39	148	CM2SW	37	165						
W7BD	40	157	W9YNB	39	148	W1KFV	37	154				WØPUE	30	88
W7BE	40	156	G2WW	39	147	W3JKO	37	154	VE3AGC	32	107	OA4AK	30	86
W6PZ	40	156	D2KW	39	147	W3OCU	37	151	W2OEC	32	105	W2SVK	30	74
G3AAM	40	154	W2COK	39	146	WØDU	37	146	W1BFB	32	94	W7JUO	30	70
W6TI	40	154	W2GUR	39	146	W2CNT	37	142	VE1NE	32	91	WØJED	30	61
W6BPD	40	152	W2MEL	39	145	W3LVJ	37	137	HA1KK	32	77	W7GC	30	53
W1AB	40	151	W6OEG	39	143	GM2UU	37	133						
W6LEE	40	150	W6JZP	39	141	W3WU	37	133	VE5JV	31	89	W6ZZ	28	60
W6FHE	40	150	W9DUY	39	140	W4ML	37	133				W8SXU	28	59
			G6BQ	39	140	W2WZ	37	123	W7BE/KH6	30	55	W2BF	27	52

W6LRU, down San Diego way, and W6RLN have been in there pitching, and each of them only recently received his 40th confirmation. W2AQW doesn't have to be introduced to you as we have all heard his call plenty. Some of you may remember that Hy was W3EDP before the war. Last, but not least, is W6DLY, who is an old-timer in these parts. Last zone for Guy was EL3A who was good enough to rush his card airmail. Once again, congratulations!

Heard Island

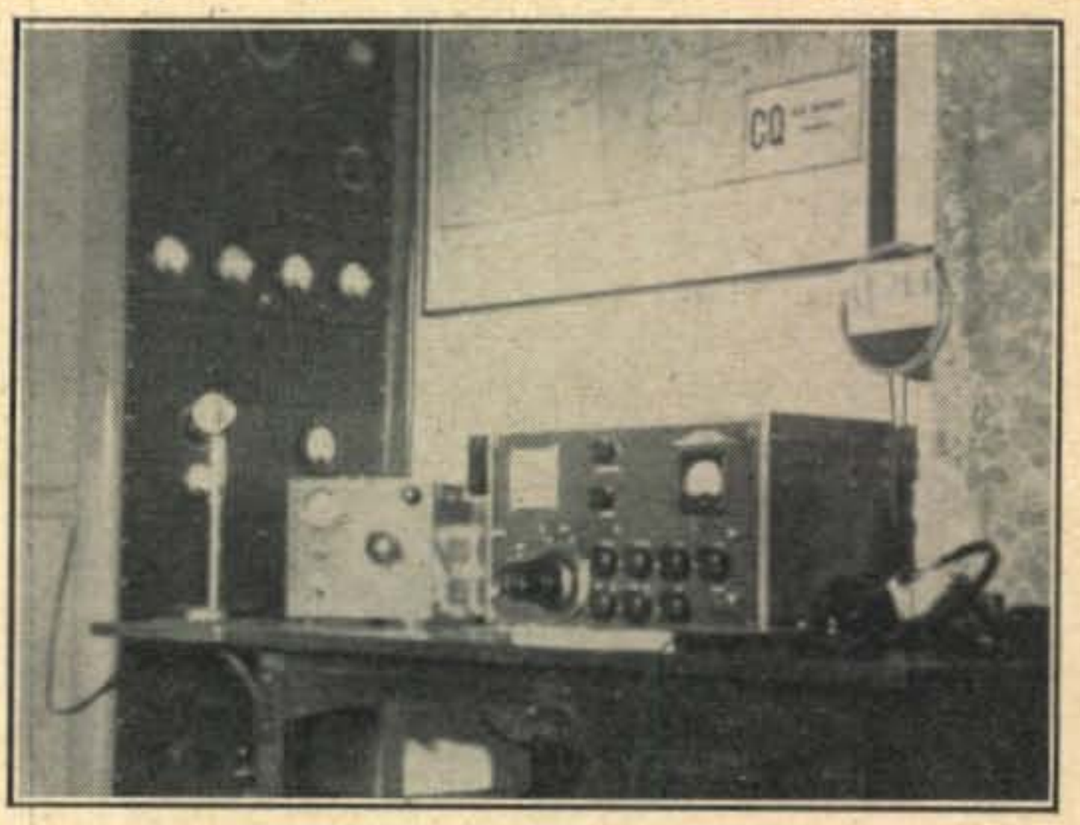
One new country for you . . . As you probably know by now, there is an Australian Antarctic expedition underway, and two special calls have been issued to two of its members, *VK1VU* and *VK1FE*. At this time they are on Heard Island, which is spotted at approximately 52° south, and 73° east. Already some wise guy has telephoned me and asked this question, "If I work VK1VU, do you suppose he will send me a 'Heard' card?" It is entirely possible that the expedition will visit another remote island; however, this will be considered when and if ham radio becomes active there. You can shoot your QSLs through the W.I.A.

FP8N and VO6BL

W1JEL has been receiving cards for the above two stations. He would like to have it known here and now that he knows nothing about *FP8N* or *VO6BL*, and from where we sit, it looks like someone is playing a dirty trick on W1JEL. Ed does all right with his own call and doesn't have to resort to using calls such as those mentioned above.

W2RRT runs 6 watts input to a Signal Shifter, and this is in turn coupled to a folded dipole. With this QRP on 20 meters, he has worked *SM7FB, GM4HZ, HB9BX, G3CFW, CO1MS,* and *F9PC* . . .W6JWL had been using a rotatable dipole but found he couldn't compete, so he cooked up a new 3-element wide-spaced beam. Now he is competing with a vengeance. As a matter of fact, some of this competition has helped him develop TVI, so he has been spending time trying to eliminate the stuff.

W2PEO was in Manitowoc, Wis., for some reason or another, but in any event the free hotel stationery probably was an incentive to drop us a line.



First VK to W.A.Z., VK2DI, Miranda, N.S.W.

Outside of picking up two new countries, he wanted it made known that he worked *PX1A*, a good one, (we hope) to replace PX1O who is NG . . . W1ENE picks up six to give him 180 . . . W3JKO is still going strong, new ones being *YK1AF, HS1LA,* and *SV5UN*.

W2BJ received word from F8EO that *FD8RG* is not going to be on in Togoland very long, so you better get after him. He might be gone by the time you read this.

VE3QD has worked some very good ones such as *ZD9AA, MD4BPC, SVØWA, LU1ZA, VP8AJ, UA3MR* (Poland), *ZS9D, KH6VP/VR4, VK9NR,* and *WØMCF/C3*. This is a pretty good batch of DX for Roy who writes the DX column for "Xtal." Speaking of his column, we see where VE6TM is working some swell DX on 20 phone, and VE6AO, after putting up his new 3-element beam for 20, has tagged his 95th country. Another 3-element beam is doing a good job for VE2WW. He has picked up stuff like *ZD1PW, ZD9AA, UG6KAA, UF6KAB, CT3AB, VS9AL,* and *VU2CR* . . . VE4RO told me, not long ago, he wasn't pounding much brass any more, but, nevertheless, he has added six good ones in *GD3UB, KH6VP/VR4, FO8AC, VK9NR, FE8AB,* and *LX1JW*.

WØNUC discovered a good one in his log the other day for which he had not claimed credit—*UA3BD/UP2*. The only one in USSR he needs now is a UM8 . . . W3JNN, being quite versatile (I mean he uses phone and c.w.), grabbed *VR3A* and *UP1AB* via the medium of A3 type of emission . . . W2PUD heard through UA3AW that there are supposed to be several UM8s on the air soon. That's fine! Save one for me . . . Will you? Dick also says there is a station signing *YM4AW* who says, "Formerly Danzig, hold QSL until you receive mine." How long is that?

W4BA is a new one to the phone section of the

W. A. Z. AWARDS

(In order of issuance)

1 W2BXA	39 WØNTA	77 W6SRU
2 W6VFR	40 W4BPD	78 W9VW
3 W6PFD	41 W9NRD	79 G3AAM
4 W6SAI	42 VK2DI	80 W3GHD
5 W6ITA	43 W6SC	81 W6BIL
6 W6MJB	44 ON4TA	82 G6ZO
7 W6SA	45 W9KOK	83 LA7Y
8 ZS2X	46 ON4JW	84 W3LOE
9 W6LEE	47 W6AM	85 W6SN
10 W8HGW	48 G3DO	86 W6AYZ
11 VE7ZM	49 W2IOP	87 W6DZZ
12 W6ADP	50 W6BPD	88 W6UCX
13 W7FZA	51 G5BJ	89 JA2KG
14 W6TI	52 W7GUI	90 W6UZX
15 W6LER	53 W6PKO	91 W6LN
16 W6WKU	54 W6AOA	92 OK1LM
17 W6YZU	55 W7BE	93 W6MX
18 W6FHE	56 W6KUT	94 W6ZCY
19 G2PL	57 W6DI	95 PK6HA
20 W6AMA	58 W4CYU	96 W6PQT
21 W7BD	59 W6MEK	97 W6CEM
22 W6NRQ	60 W6PZ	98 W6IBD
23 W6RDR	61 W7GBW	99 W3BES
24 W6TT	62 KH6IJ	100 W6MUC
25 W6PB	63 VE7HC	101 W6AVM
26 W6DUC	64 W2CZO	102 W6MVQ
27 W6ENV	65 W6QD	103 W6RBQ
28 W7AMX	66 W5AFX	104 W6GRL
29 W7DXZ	67 G3AZ	105 W6TS
30 W6PCS	68 W6EGB	106 I1IR
31 W7DL	69 W6RM	107 LU6DJX
32 W6MLY	70 W6KRI	108 ZL2GX
33 W6BAM	71 W1AB	109 W6GDJ
34 W6FSJ	72 ZL1HY	110 W6LRU
35 W6OMC	73 OK1FF	111 W6RLN
36 W6NNV	74 W3EVW	112 W2AQW
37 W6ANN	75 W6RW	113 W6DLY
38 WØYXO	76 VE4RO	

Honor Roll. Guess he and W4HA are competitors or something . . . A note from VE3AAZ says, "Here are three that didn't get away, *CR7BC, LU1ZA,* and *VP2LA.*" . . . W4INL moans a little about his beam, because, as he puts it, the wind has been working the thing over, and it looks rather ridiculous with each of the three elements on a different plain. While he is performing the major operation, he is going to boost it up to 60 feet. Atta boy, Bob . . . that's the right direction!! W5ALA has finally worked his 100th country on 10 phone exclusively. Jack does all-right on this band and, by the way, he says that *MT2FU* is ex-ST2FU.

W9NN worked a station signing *CE2BX,* not long ago, and, accordingly, mailed a QSL card. Word was received from Chile to the effect that Carlos Scheggia was lost in his plane while en route to his home from the States. His father says nothing has been heard from him. This would indicate someone else is using Carlos' call, CE2BX. We, of course, hate to see a thing like this develop, as does W9NN. Mr. Scheggia is clinging to the faint hope that this fellow, who has pirated the call CE2BX, might be a lead to his lost son. However, from all facts, it is quite obvious that this pirate has picked on this call, knowing that it has not been active for some time. Assuming this is the case, I personally hope the guilty party will realize the additional trials he has caused Mr. Scheggia.

WØDU is figuring on heading his beam in another direction now that he has worked *VQ8AY.* Missing zones for Ray are 19, 23, and 26.

XE1AC, who, as you know, tosses a wicked phone signal around the world, is feeling pretty high these days after picking off *XZ2KN.* A1 also has worked a few new countries such as *FT4AT* 14,375, *ZC1AZ* 14,349, *GC2RS* 14,181, *TI9BR* 28,384, and *SV5UN* 14,385, making around 153 countries. XE1AC also says *EA6CM* is on 20 phone, and old *EDZ,* from Rio de Oro, is back and building a new transmitter using a pair of 807s, so we'll again have this country on the air.

W6BIL, who is W.A.Z. yet holds the distinction of working the least number of countries of any of the 40 zoners, has just worked country No. 101. Since George achieved W.A.Z. he has been concentrating more on countries, and it's paying off. He says *FK8AB,* 14,002, has been coming through, as has *UM8KAA* 14,020, and *YU7RO* 14,001 . . . Here are a few worked on 10 phone by W9BZB. Since most are using v.f.o., no frequencies are listed: *VP1SJC, TI9BR, DU6IV, AG2AB, VU2ET, UA1BE, SVØWF,* and *MT2E.*

Ah, here's another A3 station we are happy to put in the phone section of the Honor Roll. It's WØPUE who operates 10 phone and goes in with 30 and 88.

Swan Island will again have *KS4AI* on the air. Ralph Bird, W5KWY, tells me he is going back there and will run about 120 watts into a pair of 807s. He will work 10, 11, 20, and 40, mostly c.w., but will try some phone. When this "Bird" starts operating on "Swan," the feathers really ought to fly! ! Oh, quiet! ! . . . W4GG is another one to work *YM4AW.* Hey, who is he? ? ?

Well, well, it even happens to some of the DX men. Yep, *ON4JW* is getting married, or will be by the time you read this. It appears as though Jules got acquainted with the "one and only" over the air while she was at the shack of G2CIN. He is seeing to it that ham radio is not neglected. Listen to this: The marriage ceremony will be performed by *ON4PJ,* while *ON4TA* will be one of his witnesses. Here's the punch line in Jules' own words, "We shall spend our honeymoon visiting our 'G' friends, so it looks as though she is going to be a radio widow from the start." Not all your honeymoon, please, Jules!

Speaking of honeymoons, it must be over for G6ZO, as he pops in with half a dozen new countries among which is *EA6AZ,* which you will hear more about in a minute. I am only kidding, Jim. I know your honeymoon isn't over!!

EA6AZ—Fish or Fowl?

This EA6AZ business is a little screwy to say the least. Have any of you fellows worked EA6AZ? If so, which one? Yep, you heard right . . . I said, "Which one?" A few of the boys have reported hearing two signals, each signing EA6AZ on the air simultaneously, and, of course, working different stations. We have no way of knowing which one is legal, and for that matter, maybe neither is. Since we have no way of knowing which one is O.K., we are not going to allow credit on any claims which you fellows send in for EA6AZ until you get a card from one. All right now, go ahead . . . say it!

I suppose many of you have been working *TI9BR,* Cocos Island, on 28-mc phone. We'll continue to give credit as a country unless something turns up to prove the guy is not land based. Up to the present time, all the information we have leads us to believe he is very much O.K.

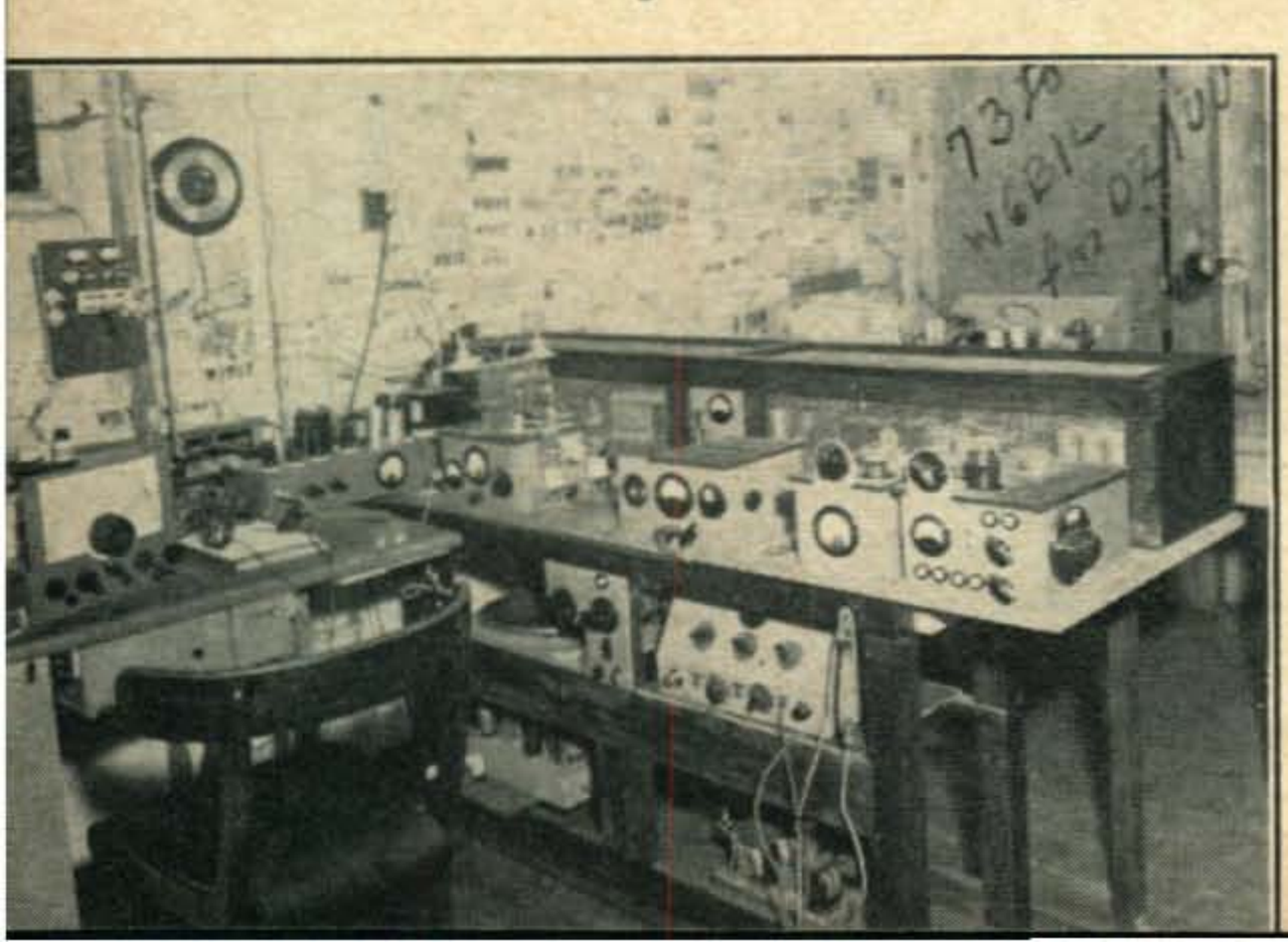
W6RW says that between the DX contest and the income tax, he hasn't worked much DX, although his 13 new countries would seem to disprove this. By the way, W6RW is treasurer of the newly organized Southern California DX Club while the other officers are W6FSJ, president; W6IBD vice president, and the secretary is W6ANN . . . A few months ago, I mentioned that I had bumped into W2TJF in San Diego. He is now W6EHV. Gordon says he finds DX conditions out here very good, and goes into the Honor Roll with his new call listed at 35Z and 98C.

W7LYL, ex-W6BFW, thought he really had worked something new when he snagged *LJ2K.* It proved to be the Trondheim Navigational School in Norway. Gene also worked *OE5YL* who said she was a YL and operating undercover . . . hmm.

W9LI says *"AG2AG"* is a fast man with a very attractive card . . . The original *ET3AB* writes to say that he understands there is a new

(*Continued on page 78*)

One of the outstanding Danish DX stations, OZ7UU.



Conducted by VINCE DAWSON, JR., WØZJB*

If the 6-meter sporadic-E openings of March 19-21 are a prelude of the type we may expect this summer—things are certainly going to boom. Many new calls were heard on the band during these openings indicating greater activity in nearly all districts. This means more QSOs during each opening, and much better chances of someone being on when conditions are just right.

No exciting DX was reported by the 144-mc men, although on March 21, W7MXN in Bellview, Wash., is reported to have heard a 90-mc east coast FM transmitter between 1130 and 1200 PST. In all probability, the 2-meter lads are busily engaged in getting their equipment ready for the coming summer months. Quite a few of the east coast gang have new receivers, including W3HWN and something he built up from "moon radar" equipment.

During one of the 6-meter openings, several of the Texans were overheard complaining that 144-mc activity was so low that they didn't bother checking the band any more. Surely our ears must have deceived us. Last year around this time, 150-300 mile contacts were an every-day occurrence and if the Houston-El Paso path had been bridged. the 144-mc record would have been purely a Texas product. No doubt after a few of these long hauls your interest will again be in 144-mc work.

Reporting

For the benefit of those new fellows on the v-h-f bands, we would like to take this opportunity to point out that this column welcomes any and all reports on DX conditions. This applies to everyone—no matter if you work one or a hundred miles, we would like to know about it. While such reports do form the backbone of this column, their usefulness does not end there. At least once a month, all reports we have received are packaged up and sent on to our propagation man, O. P. Ferrell. Perry, as many of the 6-meter gang can tell you, has been assembling and analyzing these reports in order to gather data about v-h-f propagation. As a result, various Government agencies are greatly interested in seeing more reports while attempting to fit them into their own research programs.

To keep reporting a little more uniform, *CQ* has reporting forms available for all interested parties. Just drop us a card and a supply will be mailed out to you. Further comments on activity and conditions are needed, but these should be placed on separate sheets or on the back of the reporting form. These help us present a better picture, since it is sometimes difficult to visualize just what has happened. Lastly, in sending in reports and notes for this column, please try to have them in our hands by the 20th of the month.

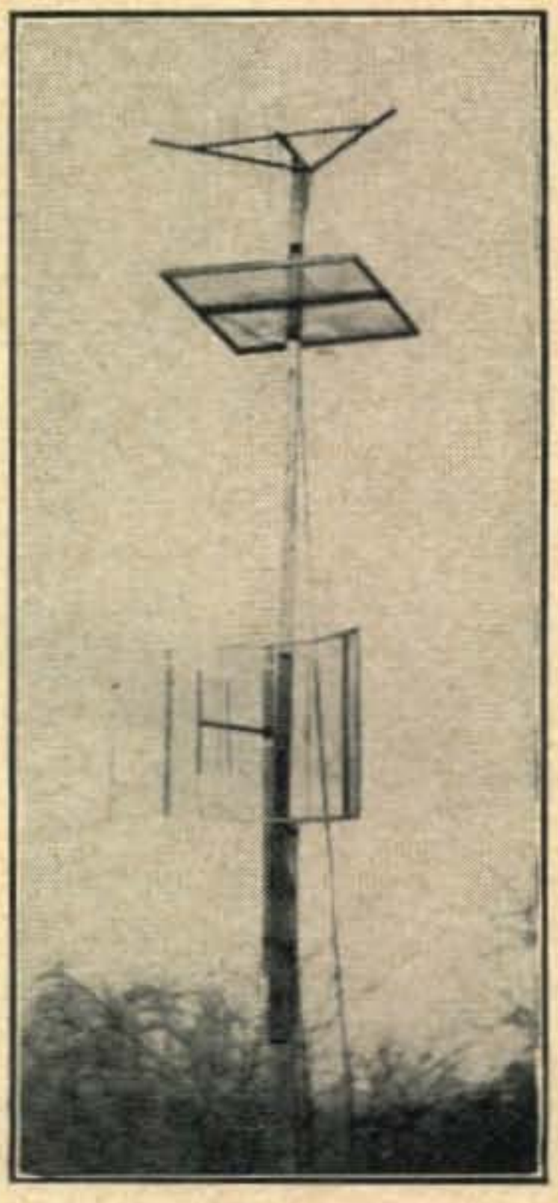
Rochester V-H-F Contest

Announced just a little too late for our last column, the Rochester V.H.F. Group is sponsoring a contest from April 23 to May 1, 1949. Work above 50 mc is encouraged with 1 point for each 6-meter contact and 2 points for each 2-meter contact. Portable work counts if it takes place within 50 miles of Rochester. Suitable prizes will be awarded, according to John Remsen, W2ZHB.

V-H-F Congress

Recently the suggestion has again been brought up that a v-h-f congress should be held. At this congress, or meeting, would be as many of the v-h-f authorities as we could safely gather together at one time. Subject matter would include everything of v-h-f interest. Sessions for antennas, receivers, propagation, etc., would be allocated. Of course, the usual time for the gang to become personally acquainted would also be set aside.

We of *CQ* feel that a meeting of this type would be a suitable place to thrash out many mutual interest problems heretofore discussed only sporadically over the air. Last year when I proposed a similar plan, I was told by G5BY, VE1QZ, ZS6T and XE1KE that they would make every effort to attend. Undoubtedly, if the meeting were arranged far enough in advance many of the fellows from out of the United States could make plans to come. Right now, answers to four questions are



420 mc can be the ideal band for fancy arrays as demonstrated by W7QLZ's square corner and parabola.

*Send all contributions to Vince Dawson, Box 837, Gashland, Mo.

required before we can go ahead any further: 1. Would you come? 2. When? 3. Where should it be held? 4. How long should the meetings run? How about some comments with your ideas on the matter?

Polarization

Whether or not the v-h-f polarization question will ever be ironed out remains to be seen. Last month (*CQ*, page 35) a few notes about the theoretical and practical differences were published. It might be well to say that they were generalized to some extent. To accurately judge which polarization is best, it is necessary to consider frequency, type of location and, particularly, the height of the antenna. Ferrell says that his analysis is progressing nicely. He also points out that above about 250-300 mc the difference in the field characteristics will completely disappear, except over seawater. Let us hope the 420-mc gang will standardize rapidly and set an example for the rest of the v-h-f world.

50-mc Openings

Feb. 22—Between 1005-1120 EST HC2OT worked W2BYM, W1AF, W5ML, W1CLS, mentioning W2BYM was the first signal heard and the last to fade out at 1120. In the evening, Steve, HC2OT, worked XE1KE at 2145 and YV5AC at 2225 EST.

Feb. 23—HC2OT found 50 mc open from 2030-2050 EST, when YV5AC, XE1GE and XE1FU were strong and steady.

Feb. 24—From 2150-2230 EST HC2OT worked YV5AC and OA4AE, with rolling QSB, and S6 peaks.

Feb. 25—XE1GE and XE1FE were worked by HC2OT, from 2222-2300 EST.

Feb. 26—Again HC2OT found 50 mc open to XE1GE, at 2240 EST, and 2250 to OA4AE, the latter weak.

Feb. 27—The XE-HC pipeline was again open when Steve worked XE1QE, XE1GE, XE1FU, from 2050-2110 EST.

Feb. 28—Things changed a bit this date for HC2OT; LU6DO was heard working CE1AH at 1945 EST, then Steve worked, between 2008-2240 EST, LU6DO, LU5DJH, LU3BO, CX3AA, CE1AH, LU9MA, LU8DJI, LU1AM, LU9DJU.

Mar. 10—XE1PA worked HC1JW for his first 50-mc QSO, using the rig he purchased from XE1KE.

Mar. 13—Aurora reflections between 1930-2132 CST when WØKPQ "roughed it" with WØBJV, W9NJT, ALU, PK, with fair condx; W8NQD had the same conditions when W9VZP and VE3-RM were worked, hearing W9NJT and W2RLV; W9ALU worked W9PK and W9VZP.

Mar. 18—W5ML, near Shreveport, heard South American harmonics and BC stations, between 48-50 mc, from 0815-1015 CST. At 0915 a c-w harmonic was heard near 50 mc, and at 1000 CST, a weak carrier near the 50-mc mark, all with his beam SSE.

March 19—This date marked the really first good Es opening of the year. In the a.m. most 10-meter operators noticed short-skip mixed in with normal F-2 skip, and immediately started giving 50 mc the usual scrutiny. W2BYM worked W4s in Florida, around 1030 EST, with W2AMJ getting in on the last of it. Things were then quiet; conditions shifted west and around 1900 CST WØUEL, in Colo., worked W5JTI, then every W5 that was on in Texas, saying there were scads of them. The band was so full of Texas drawls that many a W8-9-Ø thought Davy Crockett was on the march again. WØZJB, still with his inside dipole, heard some 15-W5s in Texas for over 2 hours, and running 15 watts managed to work W5OKR at 2043 CST. W9AB had QSOs with W5ONS, OKR, LBG, IOP, UW, NU; hearing W5VV, VY, FSC, IVU, ATJ, between 1930-2100 CST, saying QSB was bad on most signals. W5AJG had a quickie with W4EID at 2000 CST, before he QRT for TVI. (East coast take notice, it's out west now.) W5ML heard W4EID at 2050 CST, worked Miles at 2100, and W5ESZ at 2135 CST. While reports are incomplete on this opening, it was good stimulus and talk for the grapevine, since more of the gang were on the next day to join the fun.

Mar. 20—After the previous day's opening,

(*Continued on page 56*)

50 MC HONOR ROLL

CALL	S.	C.	CALL	S.	C.	CALL	S.	C.	CALL	S.	C.	CALL	S.	C.
W9ZHB	48	6	WØINI	43	3	W5FSC	37	8	W1HDQ	33	6	WØUEL	27	3
WØZJB	48	4	W9ALU	42	5	W5JTI	37	5	W6PUZ	33	4	W7JRG	27	2
WØNFM	47	5	W3CIR/1	42	5	W4EQR	37	4	W4WMI/4	33	3	W7ACD	27	2
W9QUV	47	4	WØKPQ	42	2	W5VV	37	4	W4DRZ	33	3	W7JRG	27	2
W6UXN	47	3	WØLQW	42	2	W1LSN	37	4	W7KAD	33	3	W5LBG	26	3
WØUSI	47	3	W7DYD	41	2	W6IWS	37	3	VE3ANY	33	3	WØDNW	26	2
W6WNN	47	3	W5JLY	40	11	W6OVK	37	3	W3MKL	33	2	WØYKX	26	2
W1CLS	46	6	W8ZVY	40	7	W9NJT	37	3	W1CLH	32	3	W7BOC	26	2
W9ZHL	46	6	W4QN	40	4	W9UNS	37	2	W5WX	32	3	W6NAW	26	2
W4GJO	46	4	W1LLL	40	4	W9UIA	36	3	W6FPV	31	3	G5BY	24	19
W9DWU	46	3	W4FBH	40	3	W7FDJ	36	3	W4HVV	30	2	VE1QZ	24	6
WØDZM	46	3	WØSV	40	2	W3OR	35	6	WØDER	30	2	W5LIU	24	3
WØBJV	46	3	W4GIY	40	2	W1GJZ	35	5	W1AF	29	6	XE1KE	23	6
WØQIN	46	3	W1CGY	39	6	W6BPT	35	4	W8MVG	29	6	W9AB	23	4
W7BQX	45	4	W2IDZ	39	5	W1JLK	35	4	W4LNG	29	4	W8YLS	22	3
W9PK	45	3	W6ANN	39	3	W9VZP	35	4	W7QLZ	29	4	W7CTY	22	2
W8NSS	45	3	WØDKS	39	3	W5HF	35	3	W4FNR	29	3	W8LBH	21	2
W7ERA	44	4	WØYSJ	39	2	W5HTZ	35	3	W5ELL	29	2	W5HVP	20	3
W7FFE	44	4	W4GMP	39	2	W5HLD	35	3	VE1QY	28	4	VE7NM	17	2
W8QYD	44	4	W2AMJ	38	6	W7JPA	35	2	W9FKI	28	4	W8EP	16	2
W5ML	44	4	W5FRD	38	6	W2BYM	34	4	W4FQL	28	3	VE7CN	15	2
W5VY	43	11	W2RLV	38	6	W3RUE	34	3	W1ATP	28	3	HC2OT	14	9
W5AJG	43	8	W3OJU	38	5	WØJHS	34	3	W5ESZ	28	2	KH6PP	5	7
W4EQM	43	3	W4FID	38	4	W6AMD	34	3	W9MBL	28	2			
W7HEA	43	3	W9RQM	38	2									

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Conducted by LOUISA DRESSER, W2OOH*

How many YLs have held an amateur ticket for twenty or more years, and during that time have been *continuously* active on the nam bands? That question was put to us by Helen Cloutier, W8GJX, of Escanaba, Mich., who would like to have this information for a story she is writing. Only one way we know of finding out and that is to ask you direct. We know a few of you have held a license that long, but we're especially interested in "continuously active" records. So if any of you YLs can qualify, or know of others who do, will you please drop your column editor a line?

Helen, by the way, does hold such a record. Licensed in 1929, she has been on the air with her own station in continuous operation ever since, with the exception of the war years, of course. It all began back in 1928 when Admiral Richard E. Byrd made a trip into the Antarctic region. Helen explains: "I can just remember trying, with another radio-minded high school student, to hear a faint squeal from the Byrd expedition's transmitter. Late one evening we were rewarded; the expedition was sending traffic home. My friend's receiver was a home-built affair that had no vague resemblance to any present-day receiver, but he did copy the message. That evening I decided to learn the code so I, too, could hear all the mysterious messages. From then on coded messages were tossed back and forth in school, and that's the way I mastered the code."

During the summer of 1929 Helen managed a beauty shop in Frankfort, Mich., where she also was able to attend a radio school in the evenings, and by September she had her license. Operating the low-powered transmitter at the school gave her plenty of practice in procedure and transmitter quirks, plus a bit of student operating at WFK, so that when she returned home she immediately went on the air with her first station, W9GJX.

That first station consisted of a Hartley transmitter, about 15 watts on all bands, a Silver-Marshall receiver, and a doublet antenna. With this she worked all States and plenty of DX, and during those first few months spent ten hours a day on the air.

But Helen had many other interests. She studied music, the pipe organ (which she had played at the local theater all during high school), and dancing in Chicago and Detroit with many noted radio and theater artists each summer. For six years after moving to Escanaba she had a dancing school (plus running a beauty shop). "One of my students, Kenneth Owens, has been very successful in the theater," adds Helen. "He has traveled the country with the shows 'Oklahoma!' and 'Up in Central Park.'

"But hamming still fascinated me. I became a member of ARRL, became second net control station for the AARS in this section, was made route manager in 1931, ORS from 1931 on, elected to the A-1 Operators' Club, joined YLRL in 1941, and belong to the RCC. When I left my home town Dad decided to become a ham so he could talk to me. He has been on the air since 1932 with calls W9UTY and, since the war, W8ZKR. We talk every day, either on c.w. or phone."

During the war Helen taught radio for the Air Forces. She also took some ground work and did some flying. When the war ended CAP started to train students and she was asked to teach radio. W9GJX was put back on the air, too, only now as W8GJX. At present Helen's station consists of BC-610, BC-458 and BC-459 transmitters; an SX-25 receiver and preselector for 10 phone, and a BC-348 for c-w operation. Antennas are a 3-element rotary beam and a long wire for c.w.

But that isn't all. This amazing W8GJX is talented in fields other than radio and entertainment. She has been writing since 1940 and attends Northwestern University's Writers Conference each

(*Continued on page 87*)

Assistant Editor, CQ. Send all contributions c/o CQ, 342 Madison Ave., New York 17, N. Y.

Helen Cloutier, who has been continuously active on the ham bands for the past twenty years, is pictured here with her first station (1929), W9GJX, and with her present station, W8GJX.

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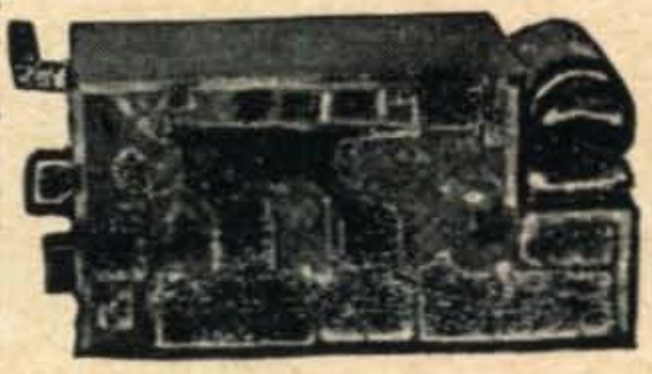

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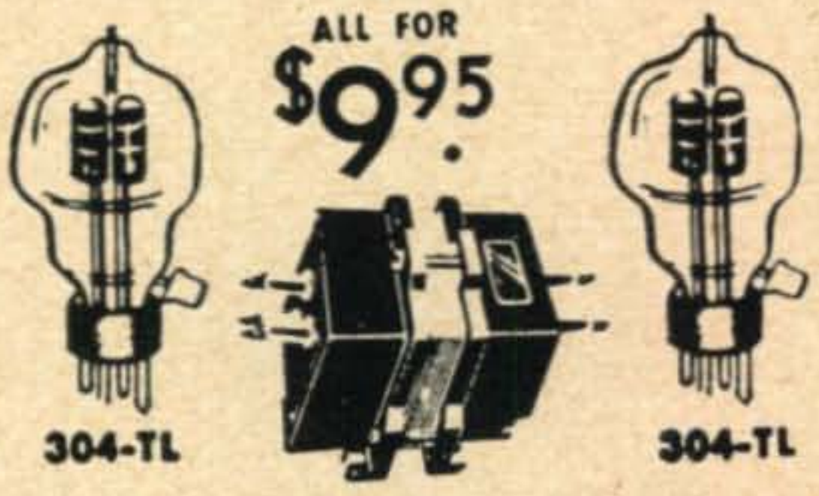

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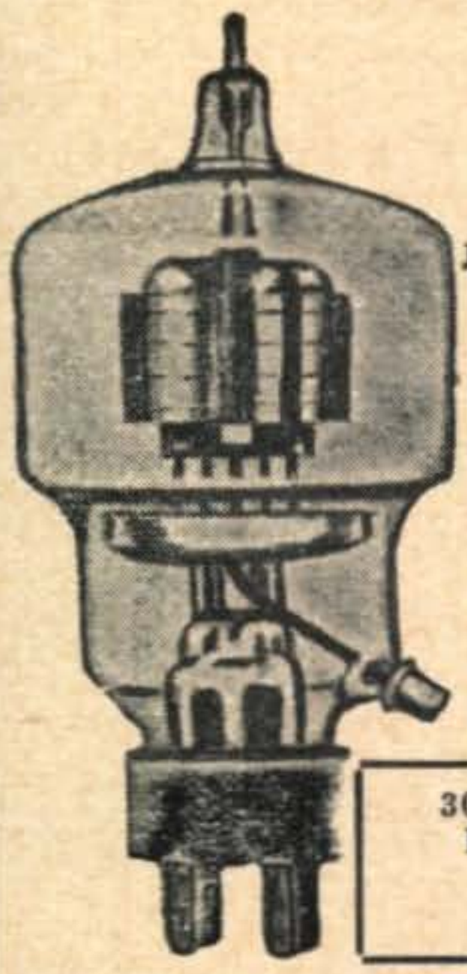

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Postscripts

IFF Owners--Attention!

WARNING! An unknown quantity of BC-966A and BC-674A IFF (identification-friend or foe) sets have been sold with the explosive detonators still intact. These explosive charges are normally triggered by an electrical impulse, but severe shock might also fire them. They were installed originally to make possible the complete destruction of the IFF, in the event of threat of capture by the enemy. Under no circumstances attempt the removal of the explosive charge yourself should your IFF set contain one. Call the local police and arrange to have a bomb squad expert do the work. In most cases it can be done with no damage whatsoever to the gear. Not all IFF sets were sold with the detonators intact, but be certain yours is not one of the contaminated units.

Bureau of Standards' Pacific Service

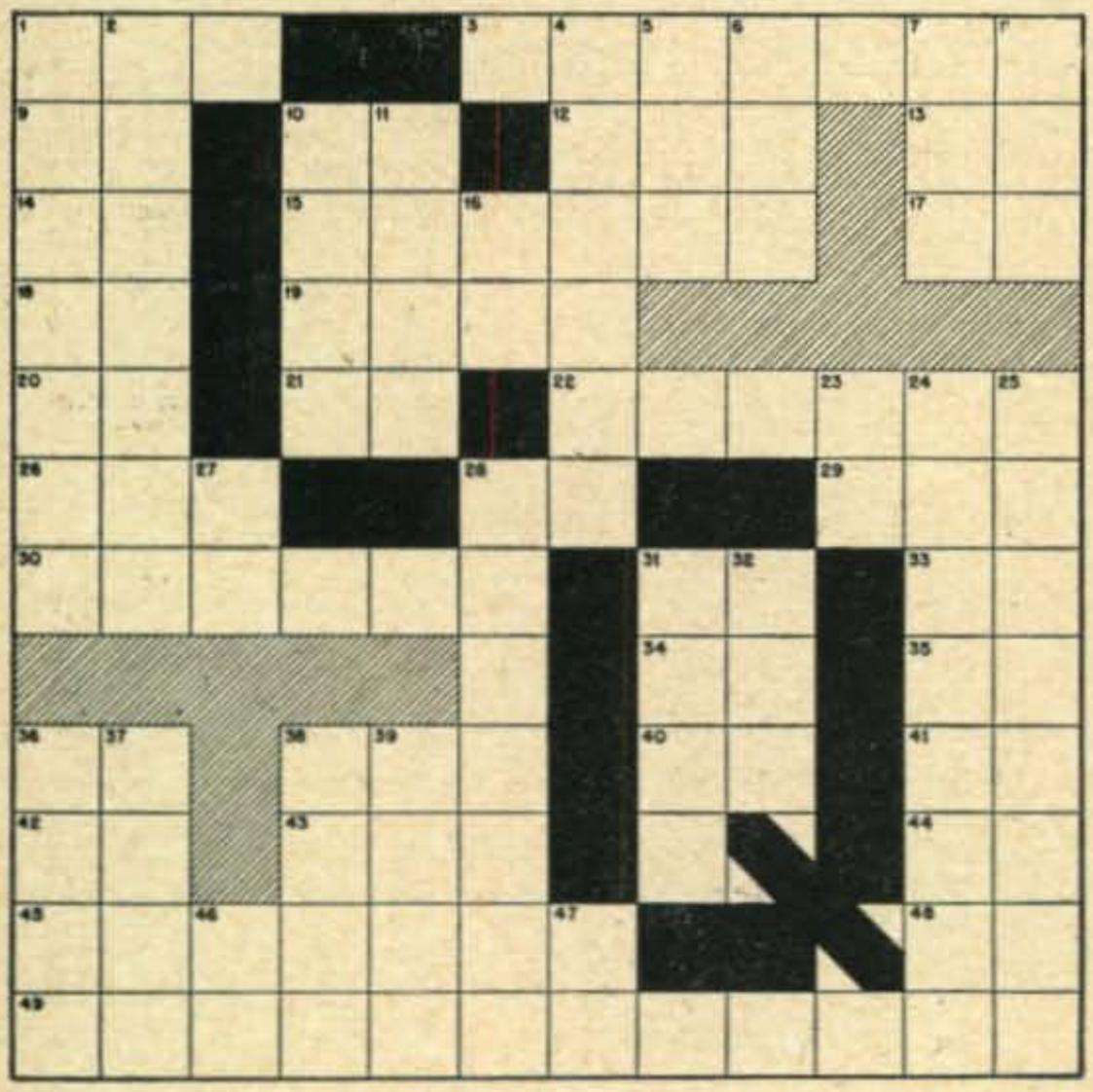
The long-felt need for additional standard frequency broadcasts in the Pacific Ocean area is now partially satisfied by the experimental operation of WWVH.

WWVH, Maui, Territory of Hawaii, is broadcasting four useful standard services simultaneously on 5, 10 and 15 mc. The operation is essentially the same as that of WWV, Beltsville, Md. Time signals marking each second (0.005 second duration a-f pulse) are transmitted on each carrier. In addition, a standard musical pitch of 440 cycles is also broadcast. The audio note, starting precisely at the beginning of each hour, is transmitted for four (4) minutes and interrupted for one (1) minute, this sequence is repeated throughout the hour. GMT is given in Morse code every five minutes. *Note*: that time announcements refer to the beginning of the following tone transmission. The call letters are given after each coded time announcement.

The second pulses of WWVH are presently synchronized to within 0.001 second of those radiated by WWV. The accuracy of the radio and audio frequencies, as transmitted for an interval of one minute or longer, is better than one part in fifty million.

The entire broadcast is interrupted for a period of approximately four minutes immediately after each hour and each half-hour to permit operation of the automatic ionospheric sounding equipment. Also, the broadcast is interrupted for a period of about thirty minutes beginning at 0700 and 1900 GMT. During these latter periods the local standards are compared with broadcasts by WWV.

Radio amateurs in the Pacific area, familiar with the duration and signal intensity of WWV are invited to write the C.R.P.L., National Bureau of Standards regarding the reception of WWVH. Of special importance would be reports concerning the same-channel interference of WWV and WWVH. Notes relative to the beat frequency observed, quality of the audio frequency as received, and the uncertainties experienced in adjusting local standards as a result thereof, would be appreciated.



By Dick Houtson, W3MAX

ACROSS

1. Moving vehicle
3. It's a mike
9. Belgian prefix
10. Watsa?
12. Chop
13. Prefix of a station in Lima
14. A military rank (abbr.)
15. Nation-wide radio network
17. First element in ham message
18. Symbol for tellurium
19. South American Indian
20. This type of equipment is in abundance these days!
21. That
22. What you must do when the RI calls!
26. African antelope
28. These fellows would have no trouble working Spain
29. That PY might well be in—
30. Religious holiday
31. Common type of pulse generator (abbr.)
33. Sound reproducer (abbr.)
34. All VQ1's live on an—(abbr.)
35. Prefix of Kon Tiki expedition station
36. Man's name (abbr.)
38. i.e. (on CW!)
40. Prefix of a hard-to-get Asian
41. q=—
42. Initials of Dr. Taylor of radar fame
43. American Amplifier and Television (abbr.)
44. Of course no crossword puzzle would be complete without the well-known three-toed sloth!
45. Type of transmission line
48. A type of oscillator (abbr.)
49. A useful instrument for checking modulation

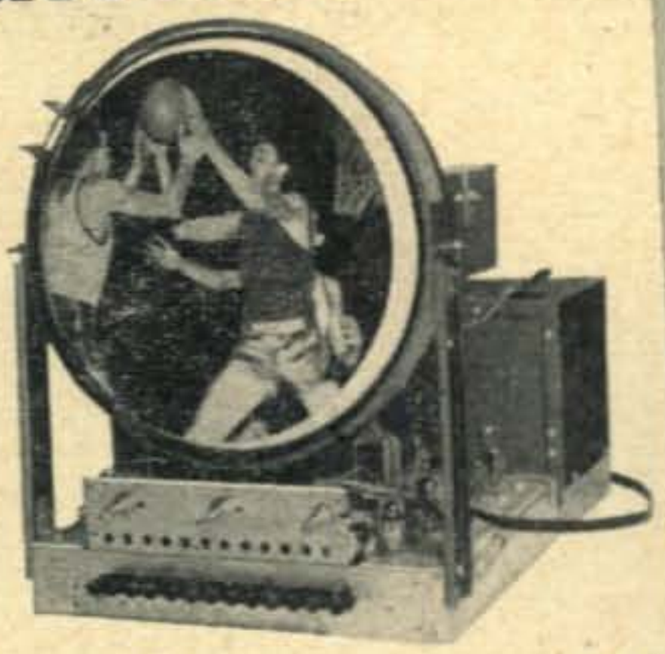
DOWN

1. Electromotive Force
2. Major headache if you live in an apartment
4. Well-known radio writer, W2AMN
5. Chief product of VS7 land
6. Sharp-pointed tool
7. Positively charged particle
8. Location of the mobile rig
10. What cathodes do
11. What you do when you want DX!
16. Main part of r-f ammeter
23. Old prefix of station in Syria
24. 1000 microamps
25. Deficient in electrons
27. DX (If you're in Africa!)
28. Type of mike
31. Grid voltage
32. R-F generator (abbr.)
36. Call letters of BC station in Texas city of same name
37. Units of conductance
38. Some of these were recently equipped with two-way radio.
39. Slow decay of code character
46. Current of rapidly changing polarity (abbr.)
47. Oscillator in a receiver (abbr.)

(See page 82 for answer)

it's ALLIED for hallicrafters!

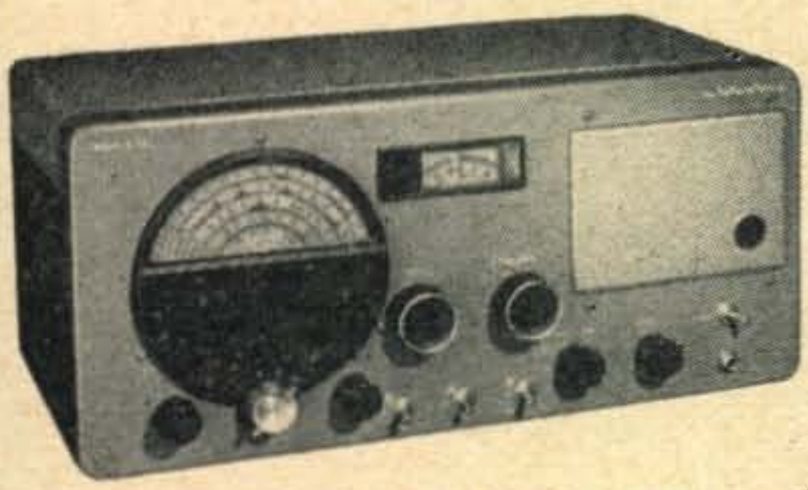
hallicrafters Model T-64 Television Chassis *with exclusive* "DUAL FOCUS" feature



Tops for custom installations at low cost—a complete direct-view chassis for 10 or 12-inch tubes. With new Dual-Focus switch—10″ tube gives you choice of big 64 sq. in. telescopic view for dramatic closeups, or large 56 sq. in. full-range view. Features: 12 channel push-button tuning; RF amplifier; 3 IF amplifiers; 2 video amplifiers; improved sync circuits; AGC; static-free FM audio system. Complete with power supply, speaker and 15 tubes, plus 3 rectifiers. Less picture tube (you can use either 10″ or 12″ size). For 105-125 volts, 50-60 cycles AC. Shpg. wt., 60 lbs.

97-875. Hallicrafters T-64 Television Chassis. *Only* **$169.95**
$33.99 down, $12.01 monthly for 12 months

6-780. 10BP4 10″ picture tube. Sh. wt., 20 lbs., *NET* $34.00
7-211. 12LP4 12″ picture tube. Shpg. wt. 25 lbs. *NET* 60.00
97-885. Bracket to permit use of 12″ tube. *NET* .. 8.50



hallicrafters S-40A & S-52 All-Wave Receivers

Popularly-priced Hallicrafters communications receivers, packed with advanced features. Cover 550 kc to 43 mc in 4 bands. Highlights include: full electrical bandspread; inertia flywheel tuning; calibrated main dial; automatic noise limiter; adjustable pitch BFO; standby switch; code-phone switch; headphone jack; shock-mounted speakers; separate sensitivity and volume controls; 3-position tone control. All tubes included. In handsome all-steel cabinet, 18½″x9″x11″. Shpg. wt., 32 lbs.

97-546. S-40A, for 105-125 v., 50-60 cy. AC.
97-588. S-52, for 117 volts AC or DC.
YOUR NET PRICE, EITHER MODEL, ONLY **$99.50**
$19.90 down, $7.03 monthly for 12 months

Send for the Leading Amateur Buying Guide

You'll find *everything* you want in receivers, transmitters, instruments, parts and station equipment in our up-to-the-minute 180-page Catalog. Get it today. And get *every* buying advantage at ALLIED—fast shipment, money-saving values, top-quality equipment, ideal easy-payment terms, square trade-in deals and down-to-earth help from ALLIED's old-time Hams. For full satisfaction, get and use the ALLIED Catalog!

ALLIED STOCKS ALL HALLICRAFTERS MODELS

SX-42 (less speaker)	$275.00
SX-62 (less speaker)	269.50
SX-43 (less speaker)	189.50
S-51 (complete)	149.50
S-53 (complete)	89.50
S-38 (complete)	49.95
HT-17 Transmitter	39.50
HT-18 Oscillator	110.00

All Prices Net F.O.B. Chicago

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Everything for the Ham

FREE

ALLIED RADIO CORP., D. L. Warner, W9IBC
833 W. Jackson Blvd., Chicago 7, Ill., Dept. 16-E-9

☐ Send FREE 180-page ALLIED Catalog
☐ Enter order for Hallicrafters Model.....
Enclosed $..... ☐ Full Payment
☐ Part Payment (Bal. C.O.D.)
☐ Send Time Payment details and order blank.

Name.....

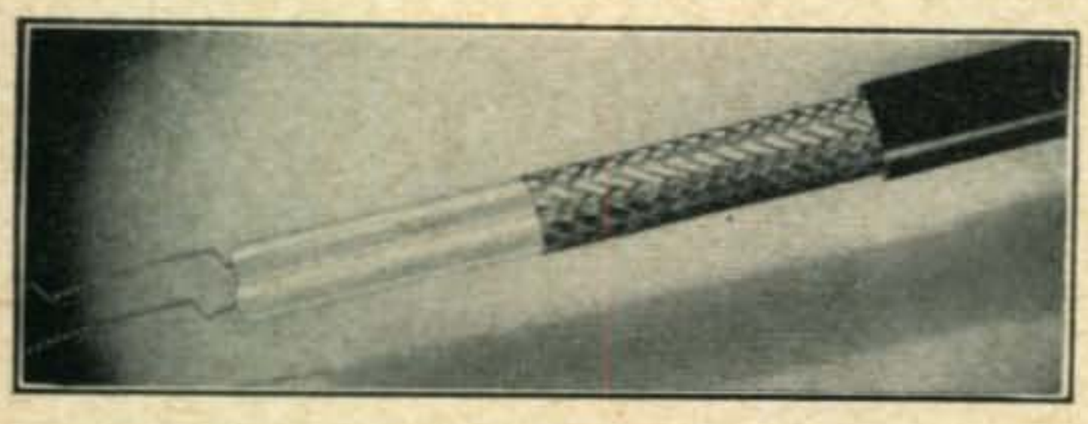
Address.....

City.....*Zone*.....*State*.....

PARTS AND PRODUCTS REVIEW

300-ohm Shielded Lead-In

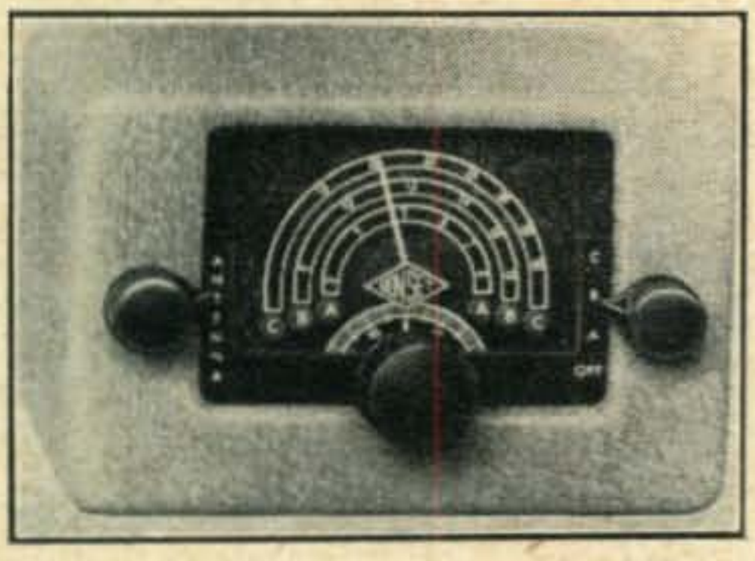
Intelin K-111, a new 300-ohm shielded, balanced line developed by Federal Telephone and Radio Corporation, East Newark, N. J., is now available.



This cable meets the demand for a shielded 300-ohm lead-in that minimizes noise, and for TV reception "snow" and "ghosts" due to transmission line pick-up.

Mobile Converter

A compact converter which permits 3-30 mc reception on an ordinary auto radio is in production by the Gonset Co., Burbank, Calif. The converter derives its power from the auto set, and uses the regular auto antenna. A switch is provided on the converter which permits either normal broadcast operation of the auto receiver or short-wave reception as desired.



By means of a bandswitch, the converter covers all frequencies between 3 and 30 mc. A bandspread dial is incorporated in order to permit fine logging of frequencies. Connection of the converter to an auto receiver is simple and takes but a few minutes time. Further details on their model 3-30 converter may be obtained by writing the Gonset Company, 72 E. Tujunga Ave., Burbank, Calif.

Heat Radiating Tube Connectors

Bud Radio, Inc. announces a complete line of Heat Radiating Plate and Grid Tube Connectors. They are designed to fit all sizes of industrial and transmitting vacuum tubes. These connectors have a dual purpose. They are useful in making connections to plate or grid terminals, and they provide a large heat radiating surface that will dissipate heat from the glass seal and tube element. All radiators are machined from special aluminum rod. Edges are rounded to minimize corona loss. Nine sizes fit all grid and plate leads and provide sufficient heat radiation for any tube operating in the range of 50 to 2000 watts.

Combination Wire Recorder Phonograph

Allied Radio Corporation of Chicago announces the release of a new low-priced combination wire recorder and phonograph. In addition to recording and playing back on wire, it plays any 78 r.p.m. 10-inch or 12-inch phonograph record, and serves as a complete PA system or as a wireless phono oscillator. It records on standard .004" magnetic wire—from microphone, from the record it is playing, or direct from any radio. The wire take-up spool serves as a rim-driven turntable for playing records. Wireless phono oscillator feature permits tuning in the wire recorder output on any radio within 150 feet with no connection between recorder and radio.

The new Knight wire recorder features simplicity of operation. Included is a neon bulb volume level indicator. Plastic leaders on wire make threading easy. Other features include rubber shock-mounting, and a high-gain, low hum-level circuit. The specially designed erase system completely removes all trace of previous recording. Built-in five-tube amplifier and PM speaker provide sufficient volume for medium-coverage PA use.

Entire unit is housed in an attractive portable case, covered in brown simulated leather with white bead trim. Handmike and cable, all tubes, and two half-hour spools of wire are supplied. For full details write to Allied Radio Corp. 833 West Jackson Boulevard, Chicago 7, Ill.

Crystal Mike and Desk Stand

Model 916 combination Century crystal microphone and desk stand is made available by Electro-Voice, Inc., Buchanan, Mich.

It combines at low cost the performance qualities and design feature of the E-V Century crystal mike with the convenient utility of a standard height desk stand. The stand has a 6" stem riser on a pressure-cast, round 4⅝" diameter base, with standard ⅝"-27 thread. Net weight complete is 1 lb. Finished in matching lustrous gray-brown. Microphone and stand are readily detachable.

New Literature

Meissner Manufacturing Division, Maguire Industries, Inc., Mt. Carmel, Ill., announces a new general catalog showing their complete line. Copies of the new catalog will be sent on request.

HENRY

HAS

Henry Radio stores in Butler, Missouri and 11240 West Olympic Blvd., Los Angeles, California have complete stocks of all Collins amateur equipment for immediate delivery. Also complete stocks of all other amateur receivers, transmitters, and parts. I promise you that you can find nowhere else lower prices, more complete stocks, quicker delivery, easier terms or more generous trade-ins. I give you 10-day free trial and 90-day free service. I promise that you will be satisfied on every detail. Write, wire, phone or visit either store today.

Bob Henry
WØARA

A FEW ITEMS IN STOCK ARE:

National NC-33	$ 57.50
National NC-57	89.50
National NC-173	189.50
National NC-183	268.00
National HRO-7	292.50
National HRO-7C	372.45
National HFS	142.00
Hallicrafters S38	39.95
Hallicrafters S53	89.50
Hallicrafters S40A	99.50
Hallicrafters SX43	189.50
Hallicrafters SX42	275.00
Hallicrafters SX62	269.50
Hallicrafters HT18	110.00
Hallicrafters HT19	359.50
RME HF-10-20	77.00
RME VHF-152A	86.60
RME DB22A	71.00
Hammarlund HQ-129X	177.30
Signal Shifter EX kit	49.75
Telvar T60-2	150.00
Harvey-Wells TBS-50	99.50
Harvey-Wells TBS-50A	121.25
Hunter 20A Cyclemaster	169.50
Subraco MT-15X	79.95

Hallicrafters & National TV sets

Gonset, Silver, Meissner, Millen, Sonar, Stancor, Bud, Mon-Key, Vibroplex, B & W, Johnson, RCA, Gordon, Amphenol, Hy-Life, Elincor, Workshop, Premax; I have everything for the amateur.

Some prices higher on west coast.

FOR EXAMPLE:

Collins 75A-1 receiver	**$ 375.00**
Collins 32V-1	**475.00**
Collins 30K-1	**1450.00**
Collins 70E-8	**40.00**
Collins 310C-1	**85.00**
Collins 310C-2	**100.00**
Collins 310B-1	**190.00**
Collins 310B-3	**215.00**

COMPLETE STOCKS

Henry has *everything* in the ham field.

QUICK DELIVERY

Shipments *4 hours* after receipt of order. Send $5.00 with order and shipment will be made at once C.O.D.

TRADE-INS

You can't beat Bob Henry for trade-ins. Write, wire or phone today about your equipment and Bob Henry will make you a better offer than you can get anywhere else.

TIME PAYMENT

Because Bob Henry finances the terms himself you get a better break. Save time and money, deal with Bob Henry on his personal, profitable time payment plan.

Butler, 3, Missouri

HENRY RADIO STORES

11240 Olympic Blvd.
LOS ANGELES 25
CALIF.

"WORLD'S LARGEST DISTRIBUTORS OF SHORT WAVE RECEIVERS"

V.H.F. — U.H.F.

(*from page 48*)

more of the gang were alerted, and sure enough short-skip again appeared on 28 mc, mixed in with the F-2 skip, commencing in the early a.m. and becoming really rampant by 1800 CST. From 1000-1200 CST W5AJG made it with W4RBK, W8LHV, NQD, UZ, WSE, W9ZBK, AB, ZHL, FDD. At 1050 CST W5ML worked W9ALU with QSB, then reports terrific signals until 1200, from W9-Ø. The real big opening came from 1830-2350 CST; in fact, most operators thought it was the middle of June. WØUEL, Colo., heard signs of the band opening at 1830, then at 1859 MST Johnny heard and worked HC2OT, with the XYL at the mike. WØZJB scrambled down off the roof, after putting up a vertical dipole, to hear XE2C S9, the only signal on the band, evidently just missing HC2OT. XE2C stayed in until 2055. At 2025 CST, with XE2C still S8, the east coast started coming in at WØZJB, who worked W3JVI, W3OJU, W4RBK, W8LBH, W8NQD, W4LVA, W3GUF, W8ZBN, W8CMS, until 2330 CST. Who said it takes power? All this was done with 15 watts into a dipole! VE3ANY from 2045-0100 worked W5ATJ, W5LF, W5EKU, W5OOJ, W5JTI, WØINI and heard XE2C on c.w., being unable to raise the latter. W5AJG had to reduce power from 250 watts to 30 watts, and use i.c.w., because of TVI. All was not lost though for Leroy worked, between 2000-2130 CST, W8LHV, WSE, UB, W9QUV and WØDZM. From 2100-2200 CST W5WX worked W8WSE, UB, LHV, LBH, NQD, W9QKM, and heard W2RLY, W3RUE, OMY, W9ZHL. W5ML worked W5ESZ and W2RLV while hearing loads of signals from the northeast. W5JTI worked HC2OT and OA4AQ. Tim says this wasn't much, but it gave him that much needed shot in the arm to get back on 50 mc.

Mar. 21—VE3ANY reports a good aurora opening from 2045 to 2300 EST when he worked W1CLS, CGY, W2MEU, AMJ, W8LHV, WØNFM; hearing W3OJU, W2RLV, W8LBH, and VE3RM. Signal strengths were S5 to 9 with W1CGY and W2MEU readable on phone. VE3APV, about 28 miles away and well in the ground wave, was heard with distortion indicating

(*Continued on page 66*)

144-Mc Honor Roll

	States	Dist.		States	Dist.
W8UKS	15	6	W8PYY	7	4
W8WJC	14	6	W9PK	7	4
W8WXV	13	5	W1CTW	7	2
WØNFM	12	4	W8RDZ	6	4
W9TKL	12	6	W8EP	6	4
W3KUX	12	5	WØBZE	6	3
W1JFF	12	4	WØGOK	6	3
W1IZY	12	4	WØWG	5	4
W1PIV	12	4	WØHXY	4	2
W3RUE	11	5	WØJHS	4	2
W9BBU	11	5	WØRNC	4	2
W3GKP	10	5	WØKPQ	3	2
WØIFB	9	6	WØDDX	3	2
W9AB	9	5	WØMZH	3	2
W9ZHB	9	4	W8YEG	3	2
W2JPA	9	4	W4LNG	3	1
W1CTW	9	3	W9UIA	2	2
W9LWE	8	5	WØSV	2	1
W9IPO	8	5	W2RPZ	2	1
W3GV	8	5	W5FSC	2	1
W4FBJ	7	5	WØZJB	1	2

Build Your Own All-Band Transmitter

...IT'S EASY WITH THIS B&W FREQUENCY MULTIPLIER

For the amateur who has always wanted to build his own all-band transmitter, this B & W all-band frequency multiplier offers the solution to the most difficult part of the job . . . developing and constructing the proper frequency set-up stages.

Complete with tubes and an attractive reverse etched, aluminum panel plate, this "package" unit covers 80—40—20—15—11 and 10 meter bands at the flip of a switch. It is designed to operate with either a V.F.O. or Crystal input with an output of not less than 25 watts an all bands.

Miniature tubes keep power requirements low, and the small size of 6½" x 7" x 9¾" makes possible its incorporation into any amateur transmitter.

Write for full specification on this latest B & W aid to building your own rig. Ask for Catalog supplement #1.

Model 504
Price $85.00
amateur net

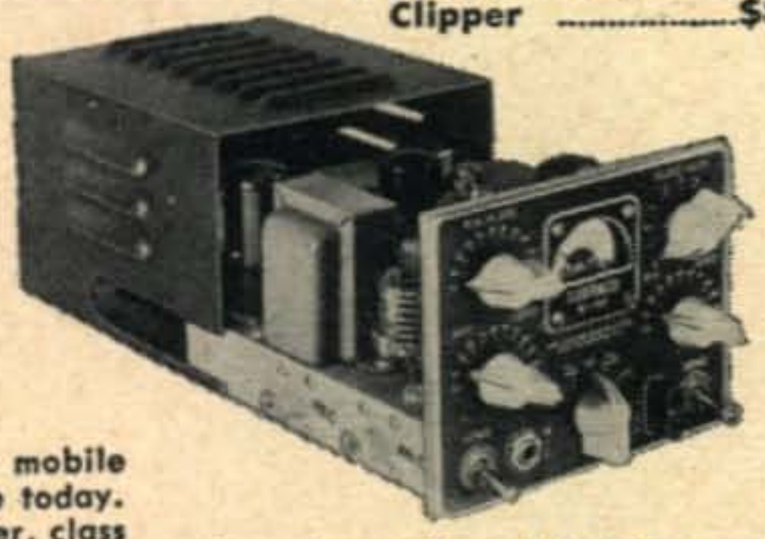
BARKER & WILLIAMSON, INC.

Dept. CQ-59 237 Fairfield Avenue Upper Darby, Pa.

HARVEY HAS THE MOST COMPLETE STOCK OF MOBILE GEAR

GONSET'S LATEST

The new converter which covers all bands from 3 to 30 mc. Same size as all Gonset mobile converters.
Model 3-30 ..... **$39.95**
The still current, and highly popular, 10-11 or 6 meter models **$39.95**
Gonset Noise Clipper **$8.25**



THE NEW SUBRACO MT 15X

The finest in mobile rigs available today. 30 watts power, class B 100% modulation, with push-to-talk and built-in coaxial type antenna relay. Xmttr complete with tubes, coaxial antenna connector, mounting brackets, etc. **$87.50**
BRAND NEW—MT15X for 20 meters **$87.50**
ALSO NEW—MT15X for 75 meters **$87.50**
(MT15X for 20 and 75 have same features as MT15X for 10-11)
Speech input. Any of the MT15X can be ordered with high-gain speech input for either xtal or dynamic mikes at an additional cost of **$9.95**

SUBRACO DS400

Dynamotor supply. 6 V. DC input, 400 V. at 175 ma. output. Complete with built-in control relays, filter, etc. **$59.95**
AC Supply for operation of any of above Subraco xmttrs indoors. Complete with rectifier and built-in control relay **$39.50**

STANCOR'S NEW ST-203-A

Mobile xmttr kit. Uses 2E26 in final, PP 6V6 modulator. Weighs 9¼ lbs. with tubes and xtal. Built-in push-to-talk relay. Complete kit of parts, less tubes and accessories **$44.70**
Completely assembled, wired and tested, less tubes and accessories **$58.90**

MOBILE ANTENNAS

Auto receiving type, collapsible, 96" **$3.60**
Premax Model AS196, solid stainless steel, 96" whip **$3.60**
Type NA bumper mount for antenna **$3.60**
Type R mount with SA spring adapter **$14.40**

LYSCO'S NEW MOBILE XMTTR

Dimensions 4 x 5 x 5½" Uses 6AG7 osc; 6AG7 amp; 6AG7 modulator for A3 emission. Available in either 10-11 or 80 meter models. Built-in antenna changeover relay Power requirements 6 V. 2 A., 350 V. 110 ma Either unit completely wired and tested, less tubes and accessories **$23.95**

Lysco model NXL noise clipper **$7.50**
Lysco grid dip meter, 3-150 mc range, calibrated dial, no plug-in coils, complete with power supply and tubes **$33.50**

All in stock for immediate delivery.

NOTE: All prices are Net, F.O.B. N.Y.C. and are subject to change without notice.

COLLINS

Collins 75A-1 receiver	$ 375.00
Collins 32V-1	475.00
Collins 30K-1	1450.00
Collins 70E-8	40.00
Collins 310C-1	85.00
Collins 310C-2	100.00
Collins 310B-1	190.00
Collins 310B-3	215.00

All Collins equipment in stock

160 METERS NOW OPEN

Harvey has in stock a complete assortment of B&W coils in all types and ratings. Also 160 meter xtals made by Bliley, Petersen, etc.

SPECIAL ANNOUNCEMENT

NEW PRODUCT FROM LABS OF JAMES MILLEN

On or about May 10 we will have in stock the first shipment of Grid Dip Meters made by Millen. This is o completely designed unit along lines of Bill Scherer's W2AEF grid dip oscillator as described in Feb. CQ and the CQ-TVI manual. Frequency range of this completely calibrated unit is 3 to 250 mc. It will sell for approximately $49.50 with complete built-in AC power supply which will use complete AC line isolation. This unit has many uses around shack and shop. Invaluable in design and construction of new equipment, tuning antennas, chasing TVI harmonics, etc. Send your order in now as shipment will be made in rotation of orders as received. Be first in your neighborhood to own one of these fine instruments.

NEW EAZON COAXIAL CABLE CONNECTORS

Solid cast bronze machined to fit RG-8/U, 11/U and all other coaxial cables of same diameter Available in four types: 4-way, model 4W; 3-way, model 3W; 2-way, model 2W; and a feed-through bushing, model FT, for running cable through chassis, cabinets, etc., without need for cutting cable. **Prices: FT-$1.50; 2W-$2.40; 3W-$3.00; 4W-$3.60.**

NEW 1949 TECHMASTER TV KIT

Exactly the same as the RCA 630TS chassis, complete kit of parts, including pre-wired and aligned RCA front end, punched chassis, with all major components and sockets mounted, etc., all RCA tubes including kine, complete manual with service notes, all RCA. New, simplified instructions. (Free circuit and parts list on request.) *Shpg. Wt 85 lbs.* **$198.50**

Less kine **$168.50**
12" tube **69.75**
15" tube **89.50**

GE FM TUNER

Only a few left of this unusual buy. Covers 88-108 mc range, uses guillotine tuning. Designed for export and tropicalized, has power inputs for 110 to 250 volts 60 cyc. *Shpg. Wt. 30 lbs*
SPECIAL PRICE **$49.50**

Telephone: LUxemburg 2-1500

hrc HARVEY RADIO COMPANY INC.

103 West 43rd St., New York 18, N. Y.

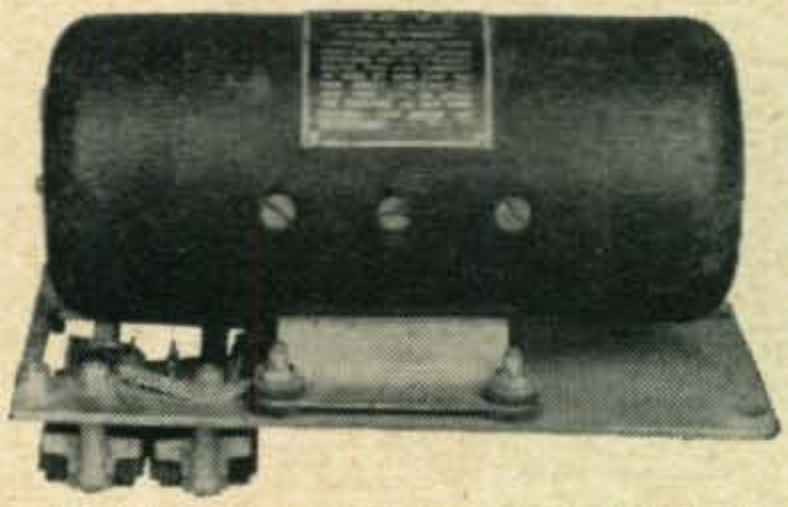
ESSE Specials!

Do not fail to closely examine this list of bargains. We believe that every item listed below is a sensational value that soon can never be repeated. All equipment advertised herein is unconditionally guaranteed to the customer's satisfaction to this extent: Return any item advertised within five days after delivery for full refund except transportation charges (both ways).

A-5 AUTOMATIC PILOT SERVO M1

Made by Delco-Remy. Has ¼ horsepower shunt type DC motor, 27.5 V. 11 amps input, speed 6000 rpm. Has hydraulic lift — (Intended use—Hydraulic lift actuates Ailerons on airplane). Overall length 16", width 12", height 11". Net weight 28 lbs. Shipping weight 35 lbs. Hardware for cable drum included. Brand new in original packing boxes. **$4.95**

DYNAMOTOR DM-35-D



Western Electric Model No. 5DY83AB7. Manufactured by G.E. for Signal Corps, U.S. Army. Input 12.5 volts DC at 18.7 amps. Output 625 volts DC at .225 amps. Diameter 3½", length 7½", mounting rack 8½" long Ideal power supply for mobile installations. Brand New in original boxes. **$6.95**

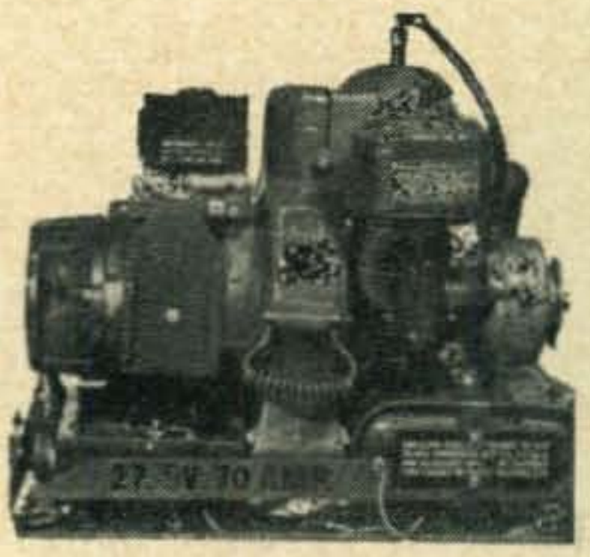
Delivers 300 Volts output at 6 Volts Input

CABLE CONNECTORS AND PLUGS

Choice .25 — All Brand New

Manufacturer	Type	Price
Amphenol	AN3101-16-10P	25c each
Amphenol	AN3101-18-18S	25c each
Amphenol	AN3101-22-5S	25c each
Amphenol	AN3102-22-15P	25c each
Amphenol	AN3102-28-10P	25c each
Amphenol	AN3102-32-5P	25c each
Amphenol	AN3106-18-11S	25c each
Amphenol	AN3106-18-18P	25c each
Amphenol	AN3106-24-6S	25c each
Amphenol	AN3106-24-7P	25c each
Amphenol	AN3106-32-5S	25c each
Harwood	AN3108-14S-	25c each
Aero	AN3108-14S-2S	25c each
Cannon	AN3108-14S-2S	25c each
Amphenol	AN3108-14S-2S	25c each
Amphenol	AN3108-18-12P	25c each
Amphenol	AN3108-22-5S	25c each
Cannon	AN3108-22-5S	25c each
Amphenol	AN3108-24-6P	25c each
Amphenol	AN3108-24-16S	25c each
Cannon	AN3108-24-16S	25c each
Amphenol	AN3108-32-5P	25c each
Amphenol	AN3108-28-10P	25c each

(HRU) DC POWER SUPPLY



24-28 V. at 70 amp. 2000 watts gasoline engine generator with electric starter. Power supply which can be used to operate 24-28 V. equipment, start airplane engines, charge batteries, as a welding machine, lighting system, or for amateur radio station. 21½", 17½" x 24⅝". Wgt., 115 lbs. **$55.00**

ESSE RADIO CO.

RECTIFIER POWER UNIT

INDIANAPOLIS, INDIANA

ATTENTION: FOR THOSE WHO NEED 6,12,24 VOLT POWER SUPPLY

Navy Type CLG-20341

110/220 Volts, 50/60 cycle, single phase AC operated. Net weight 263 lbs. Gross weight 335 lbs. 28" high, 19⅝" wide, 23¼" deep (4.25 cubic ft.).

Will continuously deliver rated load of 25 amperes at 7 volts, 14 Volts, or 28 Volts DC.

It will furnish an instantaneous dynamotor starting current of 25 amperes at 28 Volts output.

This unit is portable and is sturdily constructed in welded steel frame. It is housed in steel case provided with louvres. 4 handles for carrying are welded to case. Controls, fuses and cables readily accessible. Input and output cables are permanently attached and stored in compartments in front of case. Spare fuses and pilot lamps are easily accessible from the front. On/off switch is mounted in recessed panel on front of case.

4 connector lengths and terminals are provided for proper connections to input and output voltages. Terminal cut-out provides protection. A sturdy blower motor fan is provided for cooling of the 15 amp. Selenium rectifiers running 1550 RPM and has 10" blades.

A sensitive regulating curcuit keeps output voltage constant under varying load conditions or input voltage fluctuations. Adequate inductance and capacity are included for good filtering of the output voltages.

A complete operating manual accompanies the unit.

This equipment was made by Electronic Laboratories, Inc. of Indianapolis, Indiana and is really a very dependable fine rectifier power unit and can be compared with only the finest. It cost our Government approximately $500.00.

Our price, complete, BRAND NEW . . . $100

Spare Parts Kit for the Above Described Rectifier Power Unit Navy Type CLG-20341

Contains:

1 Resistor, WW, 9 watts, 15 ohms

1. Resistor, WW, 100 watts, 25 ohms

6 Condensers, 2000 Mfd. 50 V. Electrolytic

1 Socket and red lens

1 12 ft. 2 conductor No. 10 wire output cable, with lugs

1 25 ft. Input cable No. 10 wire, plug on cable

1 Relay, normally open, DPST, 115 V. 60 cycle AC

2 Pilot lamps 6 V., .25 amp. bayonet base

1 Switch DPDT toggle type 10 amp. at 125 V. rating

1 Thermal cutout, contacts 10 amps at 110 V. AC normally closed, switch opens at 70 degrees C°

20 Fuses, cartridge type, 15 amp. 25 Volts

10 Fuses, cartridge type, 30 amp. 250 Volts

1 Rectifier, selenium, 13 volts 60 cycle input, 9 volts 2 amps. output

2 Rectifiers, Selenium, Input 46 Volts AC, Output 35 volts 15 amps.

1 Blower Motor Assembly fan, Input 115 V. 60 cycles AC, 1550 RPM, 10" blades

2 Fuse clips, phosphor bronze

2 Cap screw, hex heads

2 Lock washer, split ring type

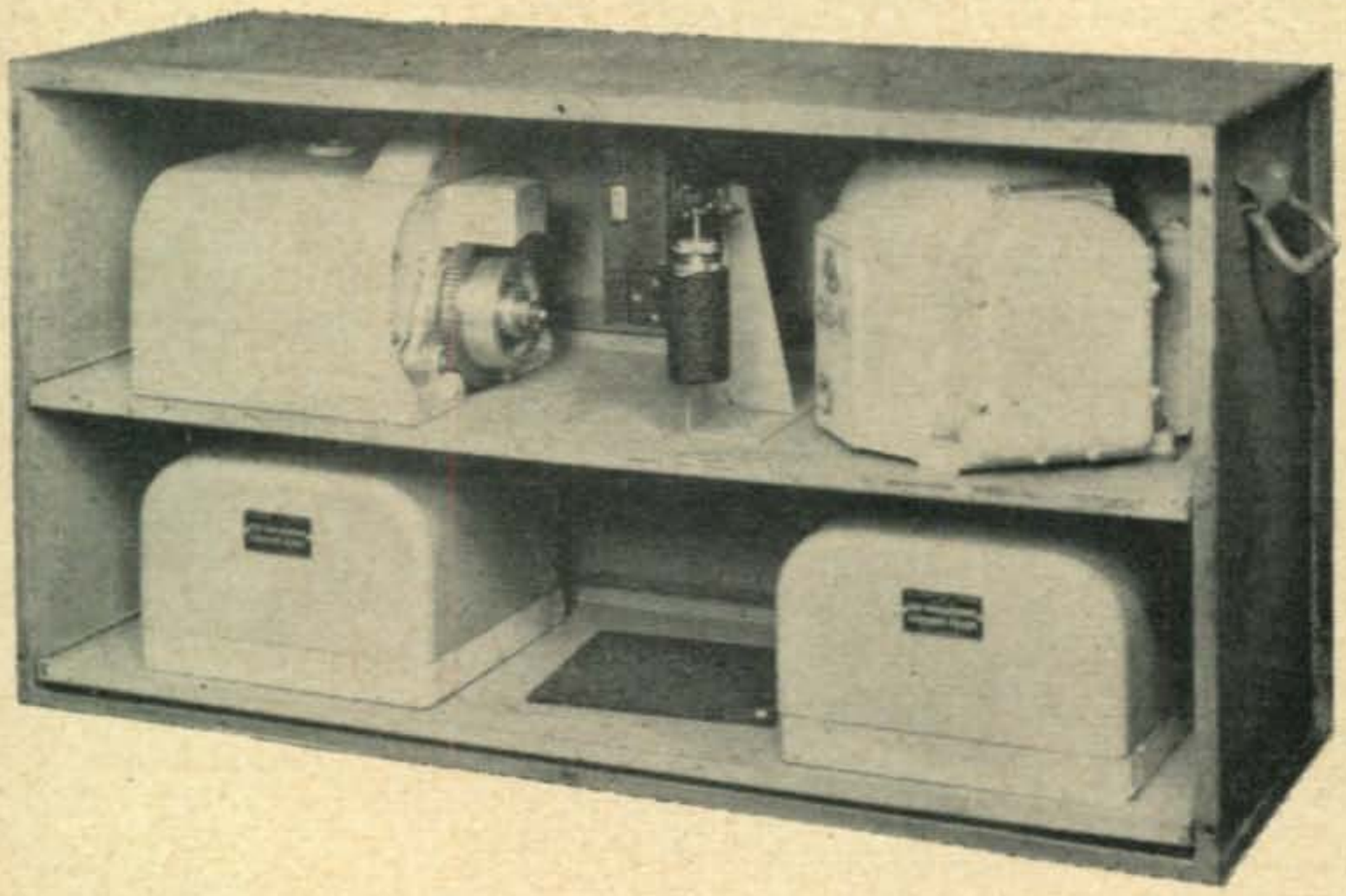
All these parts are housed in a heavy gray metal hinged box with a latch on it and cost the Government approximately $250.00.

Our price on Spare Parts Kit is ...$49.50 These are Brand New

ESSE RADIO CO.

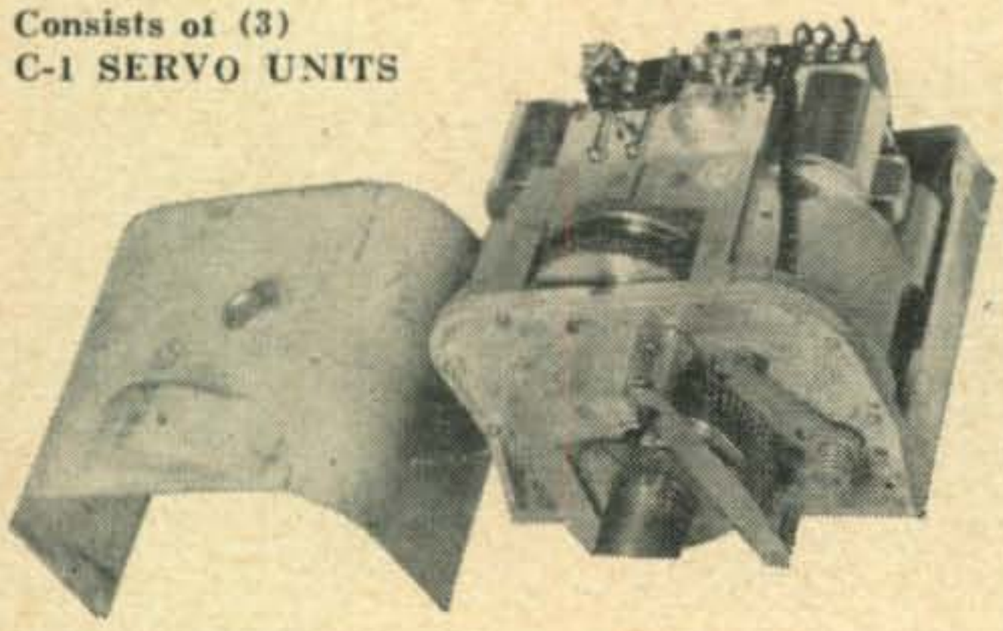
C-1 AUTO PILOT ASSEMBLY
Made by NORDEN

INDIANAPOLIS, INDIANA

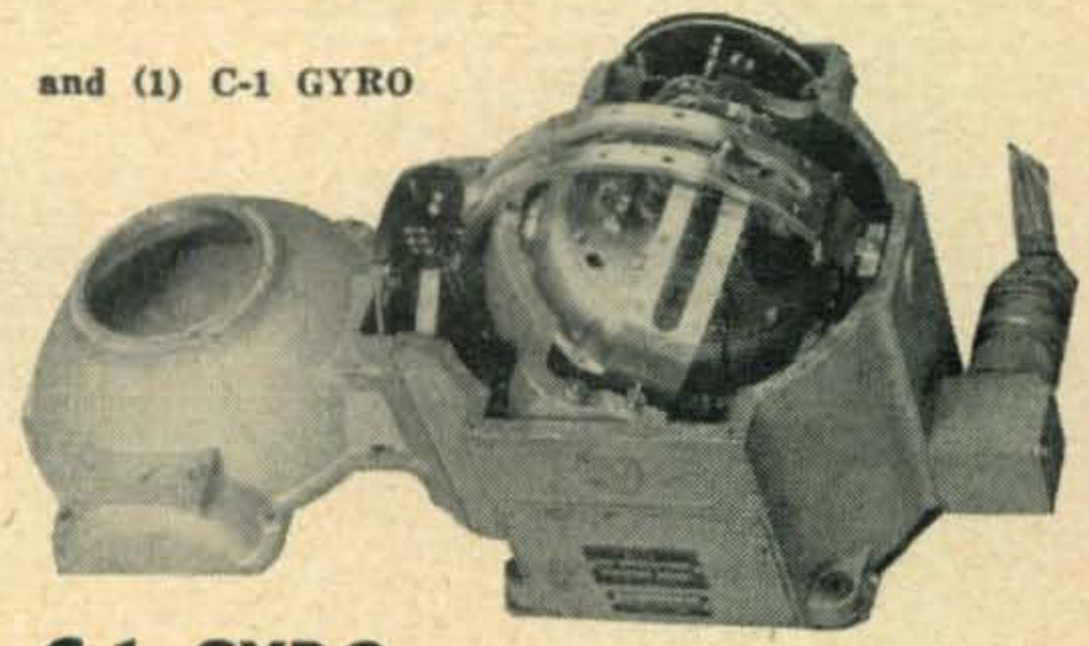


Stabilized bombing approach equipment type M-7. All the following units come housed in a steel case, size 36" long x 17" high x 12" deep. Weighs approximately 160 lbs. net.

Consists of (3)
C-1 SERVO UNITS



and (1) C-1 GYRO



C-1 SERVO UNIT

Use to rotate beam antenna, actuate boat rudder control, etc. Contains 24 V. motor, clutch, relays, etc. Reversible. Size overall approx. 10½" x 8½" x 6½".

C-1 GYRO

Part of the C-1 Auto Pilot which is sold separate and may be used to conduct many interesting and amusing experiments. Operates from 24 V. DC or may be operated for short periods on 110 V. AC. Gyro will run for approx. 15 minutes after actuating. Size—approx. 8" x 8½" x 8½".

And 1 **DIRECTIONAL PANEL** with dashpot action (not pictured).

All five of these units as described individually and as pictured at top, priced, brand new, at..... **$39.50**

PART of AUTO PILOT — BUT NOT INCLUDED IN ASSEMBLY AS SHOWN ABOVE

C-1 AUTO PILOT AMPLIFIER

Used to control operation of servo unit in response to signals received from gyro unit and control unit. The complete amplifier includes one rect. 7Y4, 3—7F7's for amplification and control, 3—7N7's for signal discrimination, 1 power transformer, 6 relays, 4 control pots, chokes, condensers, etc. Convert for use on radio controlled models, doors, etc. Operates from 24 V. DC. Size, 9¼" x 6¼" x 7⅝".

$6.95

C-1 AUTO PILOT CONTROL BOX

Used for aligning control of C-1 Auto Pilot or use for parts, etc. Contains many useful pots., toggle switches, plugs, etc. Size, 11" x 6" x 4½".

PRICE

$4.35

ESSE RADIO CO.

Esse's Special Offer

INDIANAPOLIS, INDIANA

ATTENTION! PROSPECTORS, MINERS, OIL COMPANIES PLUMBERS, etc. Below is the finest metal detecting mine detector ever constructed . . .

SCR-625 MINE DETECTOR

Brand New

Metallic Objects Only

Used by the Army to detect buried metallic mines. Its private use suggests the location of underground or underwater pipes, cables and ore bearing rock, the location of metallic fragments in scrap materials, logs, etc., and the screening of personnel in plants for carrying of metallic objects.

The unit consists of a balanced inductance bridge, a two-tube amp. and a 1,000 cycle oscillator. The presence of metal disturbs the bridge balance, resulting in a volume change of the 1,000 cycle tone. The tubes used are low-battery drain types such as 1G6 and 1N5. The circuit may be modified for control of warning signals, stopping of machinery, etc., when metal is detected. Operates from two flashlight batteries and 103 V. "B". However, a power supply operating from 110 V. may be used. Comes complete with spare tubes, spare resonator and instruction manual—in wooden chest 8¼"x 28¼"x16". Weight in operation is 15 lbs. New, complete in original overseas packing container. Originally sold by War Assets for $166.00.

The U. S. Forestry Service has recommended procedure for using the SCR-625 Mine Detector to find concealed metal in tree logs and other timber products.

PRICE $59.50
BATTERIES ..... $4.00 EXTRA

HONE and WHETSTONE

HUNTER'S and FISHERMAN'S SPECIAL! ALSO FOR HOME WORKSHOP and MACHINE SHOP

ORDER NOW

Fine quality, high-grade knife, fishhook, tool and hand-axe sharpener and polisher. U.S. Government surplus. Light weight (weight less than 1 ounce). Size ½ inch wide x 4 inches long. One-half of instrument is finest possible whetstone and other half is cork rust remover and polisher. Any trapper, hunter, fisherman, hobbyist or machinist cannot afford to pass up this bargain. Brand new.

15c EACH

$1.00 per Dozen

TRANSFORMER,

First I.F. 455 Kc. Coupling adjusted for use with 12SK7 input and 12SA7 output tubes. Brand new. Size 1¼" x 1¼" x 3¼" ..... $ .50

TRANSFORMER,

I.F. 455 Kc., permeability tuned, first I.F. Size 1¼" x 1¼" x 3¼" ..... $ .50

PHILLIPS SCREWDRIVER

6¾' overall length. Blade 3" long. Insulated non-slip handle ⅜" diameter Brand new ..... Ea. 15c

PORTABLE TRANSMITTER

Navy Department Model M1-2462 (made by RCA). Sound powered microphone transmitter with push-to-talk switch. Metal formed chestplate with adjustable strap for support about operator's neck. Pivot adjustment for placing of microphone. Has 7-wire color-coded rubber covered heavy duty cable, 20 ft. long. Units will work up to several thousands of feet apart, no batteries or external supply needed. Several units may be connected together on same circuit. Indispensable for television antenna installation, electrical wiring work, plumbing contractors and other point to point work. Transmitter only. Receiver not included.

Brand new ..... Ea. $7.50

GLASS TELEPHONE-POLE INSULATORS

Hemingway size 680. Fits ¾' wooden crossarm pin. Overall height 5", diameter 4". Will hold two single steel wires, or two pair of stranded wire cables.

Brand new ..... Ea. 20c

MAGNESYN INDICATOR

To be used for beam antenna. Practically same as 1-81-A Selsyn indicator. 15-25 V. 60 cycle AC. 3" size.

Excellent condition ..... $1.25 ea.
Plug for connection ..... .50

FIELD TELEPHONE WIRE

3 conductor, stranded, insulated and weather-proofed. Ideal for intercommunication systems, telephones, Selsyn indicators. Use it inside or out of doors. 525 foot roll. Brand new.

Price ..... $4.25 ea.

AMPHENOL LOW-LOSS UHF CONNECTOR

For RG type cable. Rugged construction, heavily silver plated, provides easy assembly and positive connection. Type 83-1AP Angle Plug Adapter polystyrene insert, pin and socket —very special. $15.00 per hundred Type 83-1R Receptacle, chassis type, low-loss Mica filled insert, very special ..... $25.00 per hundred

LIP MICROPHONE

Lip microphone, made by Wetern Electric, Navy type CW-51071, with instruction sheet, brand new.

75c each

ARGON BULBS

2 watt, 110 V., Edison base. Ideal for R.F. indication, night light. Brand new. Box of ten.

Price per box $1.25

WESTINGHOUSE RECTIGON BATTERY CHARGER BULB

Style 289416, 6 ampere rating. For replacement in most chargers or for building power supply to use on D.C. operated equipment. Brand new.

Price ..... $1.00 ea.

LOUDSPEAKER,

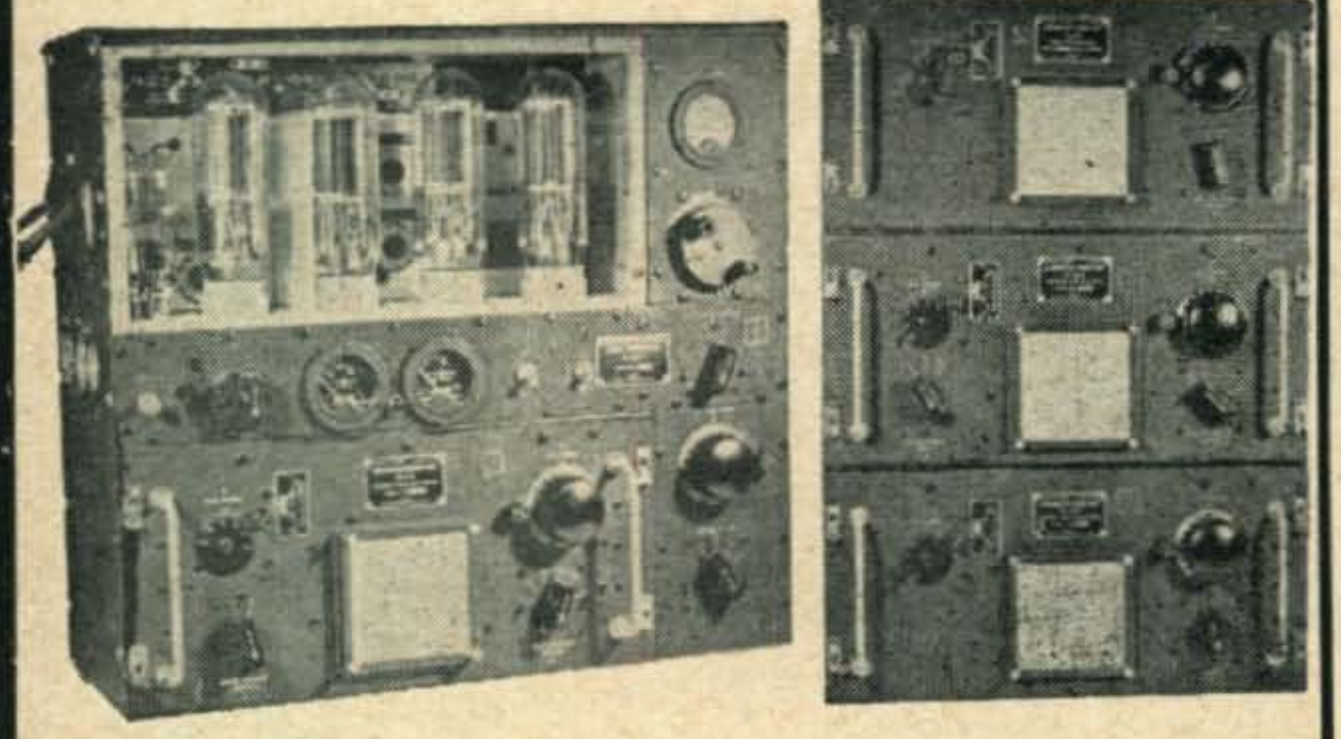
2" x 3" PM. 250-340 resonant cycles per second. Voice coil impedance 11.75 ohms. Power tube 150 Milliwatts, 1.2 volts on voice coil.

Brand new $1.00

ESSE RADIO CO.

Esse's Special Offer

INDIANAPOLIS, INDIANA



BC-375 GE MOPA TRANSMITTER

The most famous of all surplus transmitters. Was used by the Army bombers and ground stations during the War. Frequency range is covered by means of plug-in tuning units as shown below. Each tuning unit has its own oscillator and power amplifier coils and condensers, and antenna tuning circuits all designed to operate at top efficiency within its particular frequency range. Transmitter and accessories are finished in black crackle, and the milliammeter, voltmeter, and RF ammeter are mounted on the front panel. Frequency Range: 200 500 Kc and 1500-12,500 Kc. (Will operate on 10 and 20 meter band with slight modification). Oscillator self-excited, thermo-compensated, and Hand Calibrated. Power Amplifier: neutralized class "C" stage, using 211 tube, and equipped with antenna coupling circuit which matches practically any length antenna. Modulator: Class "B"—uses two 211 tubes. Power Supply: Dynamotor which furnishes 1000 V. at 350 Ma. instructions and diagram for 110 V. AC furnished upon request for **$1.00**

PRICES: As follows—

Transmitter only with all tubes..... **$12.50**

Tuning units TU-6B, TU-7B, TU-8B, TU-9B, TU-10B, TU-26B, choice..... **2.50**

Dynamotor PE-73C **4.95**

Antenna tuning unit (BC-306A)..... **4.95**

A TREMENDOUS BARGAIN

Quartz Crystals without Holders

Get an assortment of these and grind to your own frequencies or use them as they are. .5.X6" B-cut lapped on faces and squared on edges (Ready to use). We will give you an assortment of these from approximately 13 thousandths of an inch to 24 thousandths of an inch whereby you can grind to frequencies desired.

These crystals are now ground to the approximate following frequencies:

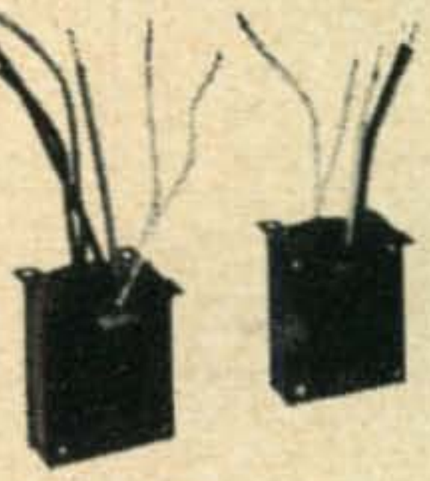
4140	5300	6700	7500
4340	5580	6850	7550
4600	5825	7300	7800
4630	5960	7400	7900
4640	6225	7480	7908

Formula for converting thicknesses of B-cut crystals to frequency is as follows: F=98.4/T where F is frequency in kilocycles and T is thickness in inches. AN ASSORTMENT OF DIFFERENT THICKNESSES **$1.50**

ATTENTION AIRLINES! BC-348 COMMUNICATIONS RECEIVER

6 bands, 200-500 Kc and 1.5-18 Mc. 2 stages RF, 3 stages IF, BFO, crystal filter, manual or AVC. Complete with tubes and 24 V. dynamotor. These receivers have been thoroughly checked in our work-shop and found in excellent condition. **$149.50**

AUDIO TRANSFORMER



RCA
No. 901869-501

Frequency response at zero Ma. DC plus or minus 3 db 100 to 1,000 cycles. Four windings are provided as outlined below.

Color Code	Ohms
1—Red-Black	580
2—Yellow-Purple	158
3—Blue-White	.63
4—Orange-Brown	9350

Inductance	Q
.590 hy	3.8
.657 hy	5.5
64 Mu hy	.7
89.5 hy	4.6

Turns ratio	Impedance ratio
1 to 4 is 1:6.6	1:43.7
1 to 2 is 1:1	1:1
1 to 3 is 300:1	90000:1
4 to 2 is 6.6:1	43.7:1
4 to 3 is 198:1	3940000:1

Brand new, price..... **50c** each
ten for **$3.50**

DRY ELECTROLYTIC CAPACITOR

Size 1⅜" dia. x 3" long, 4 terminals. Aluminum case.

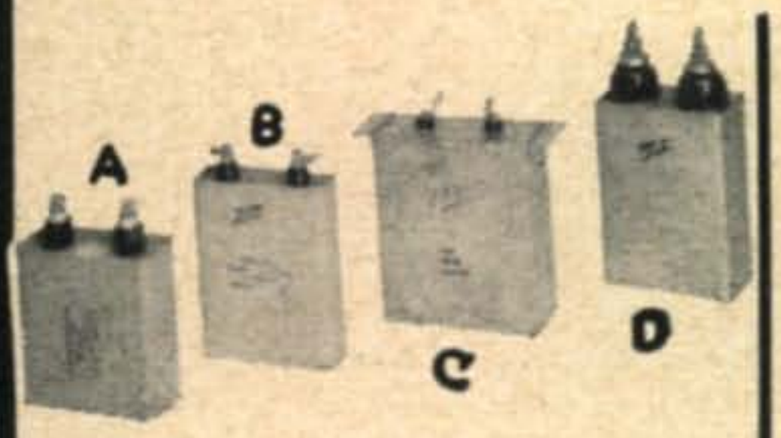
30 Mfd. at 450 V. DC
15 Mfd. at 450 V. DC
15 Mfd. at 350 V. DC
40 Mfd. at 25 V. DC

Price, brand new,.....each **35c**
ten for **$3.00**

ESSE RADIO CO.

Esse's Special Offer

INDIANAPOLIS, INDIANA



(A) FILTER CONDENSER, G. E. Pyranol, Oil-filled. 4 Mfd. at 600 Volts DC working voltage. Size 1" x 2¾" x 4½" high. Price 40c ea.

(B) FILTER CONDENSER, G. E. Pyranol, Oil-filled. 8 Mfd. at 600 Volts DC working voltage. Size 1" x 3¾" x 4½" high. Price 75c ea.

(C) FILTER CONDENSER, 8 Mfd. at 700 volts DC working voltage. Oil filled, well insulated terminals. Size about 2" x 4¼" x 5" high, with mounting flanges, gray metal case. Shipping weight about 4 lbs. Price 50c ea.

(D) FILTER CONDENSER, Cornel-Dubilier, 1 Mfd. at 4000 volts DC working voltage, oil filled. Size about 2¼" x 4" x 7" high over all. Shipping weight about 4 lbs. Heavy stand-off insulator type terminals. Price $2.00 ea.

TURBO AMPLIFIERS

Used for parts or small phono-amplifier, shipped complete with the following tubes: 2—7C5's 1—7Y4, 1—7F7. Our greatest bargain. See July 1947 "Radio Craft" for conversion data.
10 For $7.50

ULTRA-VIOLET FLUORESCENT COCKPIT LIGHT ASSEMBLY

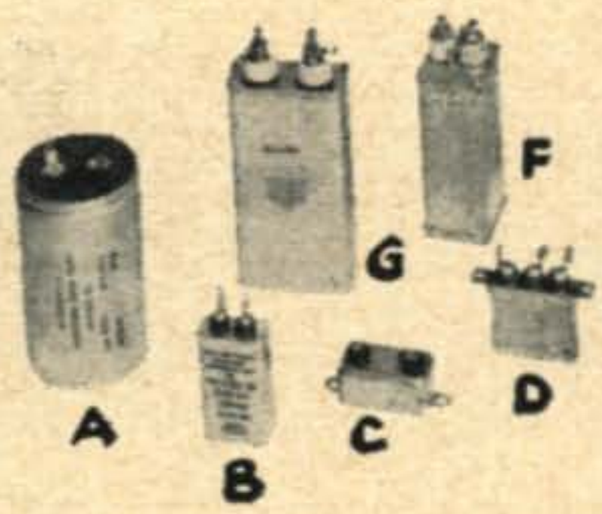
Air Corps type C-5, 28 V. DC operated. Black plastic case about 1½" dia. x 3" long. Has adjustable mounting flange, 3 foot two conductor shielded cord and plug. Includes bulb. Brand new. Each $1.00

CO-AXIAL CABLE

For high frequency low-loss trouble-free weather proof, durable service. Fully shielded, cut to length. Brand new. RG8/U-52 ohm. Price — 100 ft. for $4.95

OXYGEN TANKS 500-LB. PRESSURE

Aviators oxygen breathing bottles. Non-shatterable. Ideal to use for air tank on air horns, paint sprayers, pneumatic tools. Excellent condition. $3.50



(A) CONDENSER, electrolytic, 100 Mfd. @ 300 Volts, 2½" dia., 4½" high, metal can, shipping weight 2 lbs. Price 40c ea.

(B) CONDENSER, RCA, oil filled, 1 mfd. @ 250 volts DC working voltage. Price 15c ea.

(C) CONDENSER, bath tub type .1 mfd @ 1000 volts DC. Price 10c ea.

(D) CONDENSER, Tobe, oil filled 3 x .1 mfd. @ 600 Volts DC Price 10c ea.

(F) FILTER CONDENSER, Aerovox, oil filled, 2 mfd @ 600 DC working voltage, size about 1½" x 1½" x 5" high, shipping weight about 1 lb. Price 10c ea.

(G) CONDENSER, Cornel-Dubilier, oil filled, 4 mfd. @ 1000 volts DC working voltage, size about 1" x 2½" x 5" high, shipping weight 2 lbs. Price $1.00 ea.

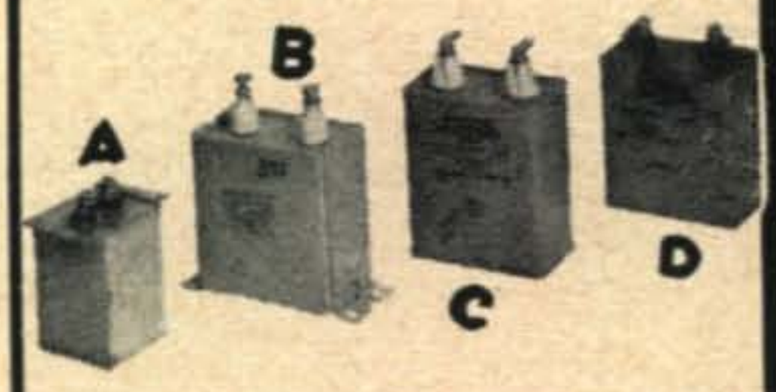
AUTOMATIC DIRECTION FINDER RADIO COMPASS SCR-269-G

Brand new in original crates
Made by Bendix
Complete, a truly magnificent buy for airplane owners or boat owners.

$125.50

POWER SUPPLY FOR SCR-269-G RADIO COMPASS

A Holtzer Cabot Elec. Co. manufactured Inverter which changes a DC power source such as from the Aircraft battery to the required AC power source needed for operation of the SCR-269-G Radio Compass. Rated input 24 Volts 36 Amps. DC, output 115 volts 400 cycle 500 V.A. and 26 volts 400 cycle 250 V.A. Approximate weight uncrated 25 Lbs. $12.95



(A) FILTER CONDENSER, oil filled, 4 Mfd. @ 300 volts DC working voltage, size about 2" x 2" x 3½" high, shipping weight about 2 lbs. Price 20c ea.

(B) CONDENSER, G.E. or Aerovox, .25 mfd. @ 20,000 volts DC working voltage. Size 4" x 8" x 16". Price $18.00 ea.

(C) FILTER CONDENSER, Industrial Condenser Corp., oil filled, 1 mfd. @ 3000 volts DC working voltage, size about 2¼" x 3½" x 5" high, well insulated terminals. Shipping weight about 3 lbs. Price $2.00 ea.

(D) CONDENSER, Chicago Industrial Corp., 2.5 Mfd. @ 300 Volts DC working voltage, oil filled. Size 2" x 2" x 4½" Price 20c ea.

BC-221 FREQUENCY METER

Covers 125-20,000 Kc. Battery or 110 V. AC or vibra-pack operated. A beautiful instrument The finest we have ever had. $69.50

SCR 274N COMMAND SET OR BC-348 POWER SUPPLY

To convert the BC-348 receiver for 110 V. AC operation. Constructed especially for the Esse Radio Company by a leading transformer company.

These power supplies have gained great popularity due to quality, price and simplicity in conversion. Filament supply 24V. Rectifier tube used: 6x5 (not included). $5.95 ea.
Price .....

ESSE RADIO CO.

CONDENSERS

INDIANAPOLIS, INDIANA

1.	Cornell-Dubilier—2 mfd. @ 1000 V. DC. 1" dia. 5" tall. (Oil filled)	60c
2.	Cornel-Dubilier—4 mfd. @ 600 V. DC. 1" dia. 5"	60c
3.	Electrolytic 40 mfd. @ 450 V. DC Mallory F P aluminum can.	60c
4.	Electrolytic 40 mfd. @ 450 V. DC Mallory F P aluminum can.	60c
5.	Electrolytic, triple 20 mfd. @ 25 V. DC Mallory F P aluminum can.	30c
6.	Electrolytic, 30 Mfd. @ 150 V. DC., Mallory F. P. aluminum can.	35c
7.	Bath tub type .3 mfd. @ 50 V. DC	15c
8.	Oil filled 3 x .1 Mfd. @ 600 V. DC Tobe	15c
9.	.5 Mfd. @ 600 V. DC. (Bath tub)	15c
10.	Three gang trimmer condenser assembly, each adjustable 5 to 45 mmfds.	15c
11.	Neutralizing, for 6L6 or 807 tube, applications. (Plunger type)	15c
12.	Variable tuning condenser, 7-17 mmfds. 1½" shaft, ceramic insulation, single hole mounting	15c
13.	Padder type variable, 100 mmfds the maximum, screw driver slot in shaft for adjustment.	25c
14.	Electrolytic 1000 Mfd. @ 15 V. DC 1¼" diameter x 4½" high metal can	25c
15.	Electrolytic, 50 Mfd. @ 350 V. DC Mallory FP aluminum can.	60c
16.	Electrolytic, mounts in octal tube socket 10, 5 and 15 mfd. @ 100 working volts DC. Aluminum can.	35c
17.	Oil Condenser, .25 mfd. @ 400 V. DC	15c
18.	Oil condenser, 5.2 mfd. @ 50 V. DC	25c
19.	Oil condenser, 50 mfd. @ 10 V. AC	15c
20.	Oil condenser, dual .5 mfd @ 490 V. DC	35c
21.	Oil condenser, 1.5 mfd. @ 300 V. DC	25c
22.	Oil condenser, dual .125 mfd. @ 400 V. DC	25c
23.	Electrolytic condenser, 1000 mfd. @ 25 V. DC.	75c
24.	Electrolytic condenser, 2000 mfd. @ 50 V. DC	1.50
25.	Electrolytic condenser, 10 mfd. @ 50 V. DC	15c
26.	300 mmfd. ± 7.5 mmfd. ceramicon cond.	10c
27.	Electrolytic condenser, 2500 mfd. @ 3 V. DC	15c
28.	Add "C" condenser, .14 mfd. @ 50 V. DC	15c
29.	Electrolytic condenser, 25 mfd. @ 475 V. DC	75c
30.	Electrolytic condenser, Triple 20 mfd. @ 25 V. DC.	75c
31.	Electrolytic condenser, Triple 100 mfd. @ 35 V. DC.	35c
32.	Bathtub condenser 25 mfd. @ 25 V. DC	15c
33.	Bathtub condenser .5 mfd. @ 200 V. DC	15c
34.	Bathtub condenser .5 mfd. @ 600 V. DC	15c
35.	Bathtub condenser, .3 mfd. @ 50 V. DC	15c
36.	Electrolytic condenser, .14 mfd. @ 50 V. DC	15c
37.	Bathtub condenser, dual .1 mfd. @ 600 V. DC	15c
38.	Bathtub condenser, triple .1 mfd. @ 400 V. DC	15c
39.	Mica condenser, .02 Mfd. @ 600 V. DC	per hundred 3.00
40.	Mica condenser, 390 mmfd. Silver Mica 400 V. DC	per hundred 5.00

MICA CONDENSER KIT

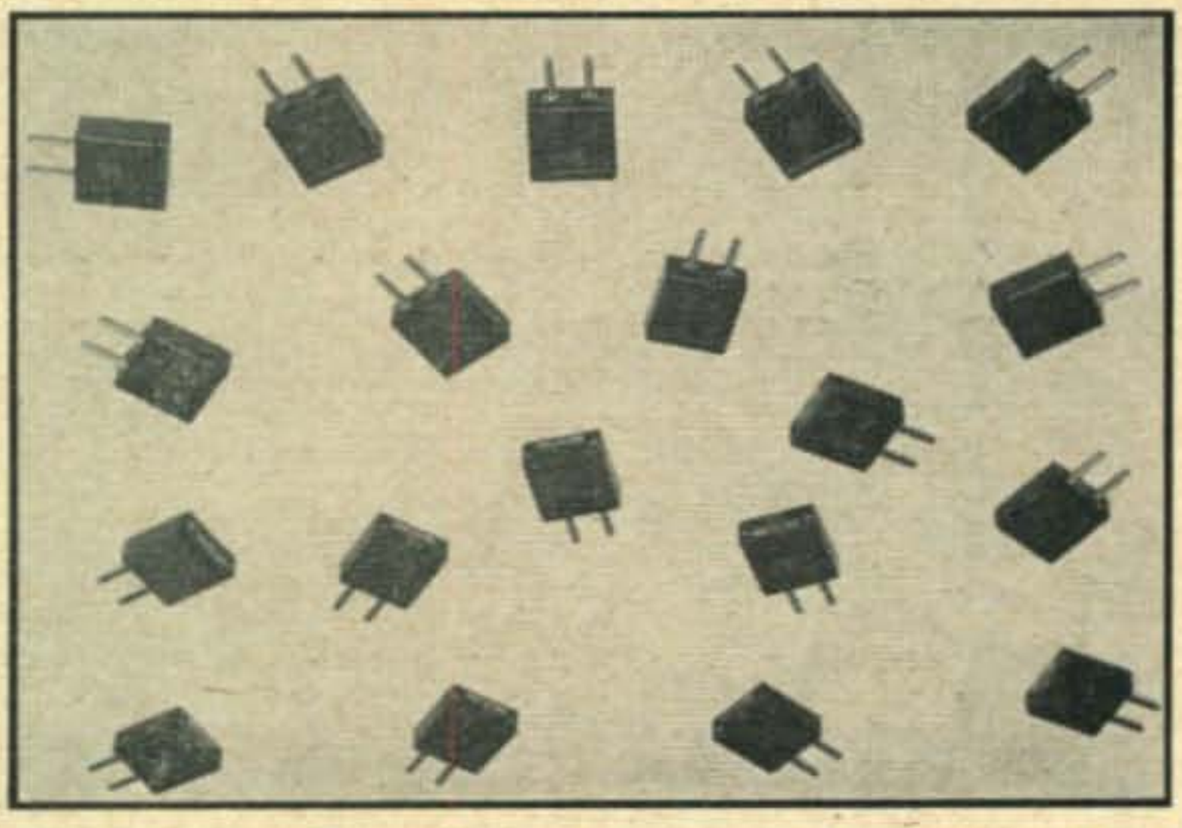
Many assorted values of capacity and voltage approximately 100 condensers per kit. All new.

$1.25

500 V. DC CERAMICON CONDENSERS

300 mmfd.	10c ea.
120 mmfd.	10c ea.
6 mmfd.	10c ea.
24 mmfd.	10c ea.

Crystals in Standard 5-Prong Socket Holders Choice 50c



5560	7340	7990	8360	8477
7210	7660	8124	8361	8480
7240	7670	8245	8362	8486
7250	7680	8250	8367	8488
7260	7690	8251	8400	8520
7280	7700	8252	8450	8530
7290	7710	8351	8451	8540
7300	7950	8356	8452	8541
7320	7970	8357	8476	8547

PAPER CONDENSERS

		Each
.0001 mfd.	1600 volts	$0.20
.005	1200	.25
.006	1600	.20
.02	1600	.20
.1	1500	.20
.0018	800	.15
.25	600	.20
.02	600	.10
.0475	200	.10
.002	600	.10
.003	600	.10
.005	600	.10
.01	600	.10
.01	500	.10
.25	400	.15
.1	400	.10
.01	400	.10
10	450	.35
20	250	.40
30	250	.45
05	200	.10
40-20-10	150	.50
20-20	150	.50
50	150	.30
20	150	.35
.5	120	.30
.5	100	.30
10	60	.25
.5	50	.30
10	25	.25
.25	25	.20

ESSE RADIO CO.

ESSE WILL BUY

INDIANAPOLIS, INDIANA

AGAIN ESSE REPEATS THIS ADVERTISEMENT

ATTENTION FACTORIES, HAMS, DEALERS, INDIVIDUALS — JUST ANYBODY . . .

Some of the equipment listed below is urgently needed by our company to meet the demands of customers and we will pay the highest cash prices.

Send letter with full description describing condition and quote price. We will immediately answer and if we can use your equipment, we will authorize you to send it to us COD.

Our prices will amaze you. We will perhaps pay you quite a bit more for some of the below listed equipment than what you paid for it. Please don't hesitate to write us immediately.

WE NEED AT ONCE

BC-348 Receivers, AC or DC models
BC-312 Receivers
BC-221 Frequency Meters
Telrad Frequency Standards
SCR-522 transmitters & receivers
APN-4 Radar Scopes
Hallicrafters BC-610 Transmitters
Any factory built transmitters and receivers such as Hallicrafters, National, Temco, Collins, RCA, RME, Hammerlund, Millen, Meck, Harvey-Wells, Meissner, Sonar, McMurdo-Silver, Gonset, Stancor, Bud, etc.
Amateur or commercial sets
Public address systems & equipment
Large stocks of tubes
Large stocks of transformers
Large stocks of condensers
Large stocks of resistors
Large stocks of speakers

BC-224 Receivers
BC-342 Receivers
BC-412 Radar Oscilloscopes
BC-645 Transmitter-receivers
Command Set Transmitters & Receivers
TBY Transceivers
PE-103A dynamotors
BC-1068A Receivers
Police type VHF transmitters and receivers for mobile application
Propellor pitch motors
Collins ART-13 Transmitters
APS-13's
SCR-269F or G Fairchild or Bendix ADF's
Headphones in quantity lots
Microphones in quantity lots
Field telephones
Sound-powered telephones

We are especially interested in any factories, dealers or other outlets giving us a list of surplus electronic equipment that is for sale so that we may submit our bid.

ESSE Radio Co
130 W. New York St.
Indianapolis 4, Ind.

Unless Otherwise Stated, All of This Equipment Is Sold As Used
CASH REQUIRED WITH ALL ORDERS
Orders Shipped F.O.B. Collect

phase interference from the aurora. W5AJG worked W6AMD at 2030 CST.

Mar. 24—W5JLY worked OA4AE at 2000 CST.

Mar. 25—W5JLY worked OA4AE and HC2OT after 1400 CST. Signals were in for nearly two hours.

Mar. 26—W5JLY worked HC2OT for 45 minutes starting at 1330 CST.

The V-H-F Gang

Here's news that Newfoundland is represented on 50 mc. WØKIW, formerly at Topeka, Kans., Air Force Base, is now in Argentia, Newfoundland. Les says that his 6-meter rig and converter arrived in good condition and that he will be looking for signs of Es skip, way before this appears in print. He also mentions that his CO is now transmitting simultaneously on 10-6 meters, not mentioning calls or frequencies. At any rate, it will pay the east coast gang to gander up that way, especially when the VE1s are coming through this summer.

KL7KV in Anchorage, Alaska, advises he now has an SCR-522 converted to 50 mc, and can be found any time there is an indication the band may open, on 50.04 mc. Other stations in Anchorage who can get on 50 mc include KL7AH, KL7NT, and KL7TC. KL7KV wonders which direction he should point his beam for U.S. contacts; he hopes to know the answer soon, although he missed the big aurora openings of Jan. 24-25.

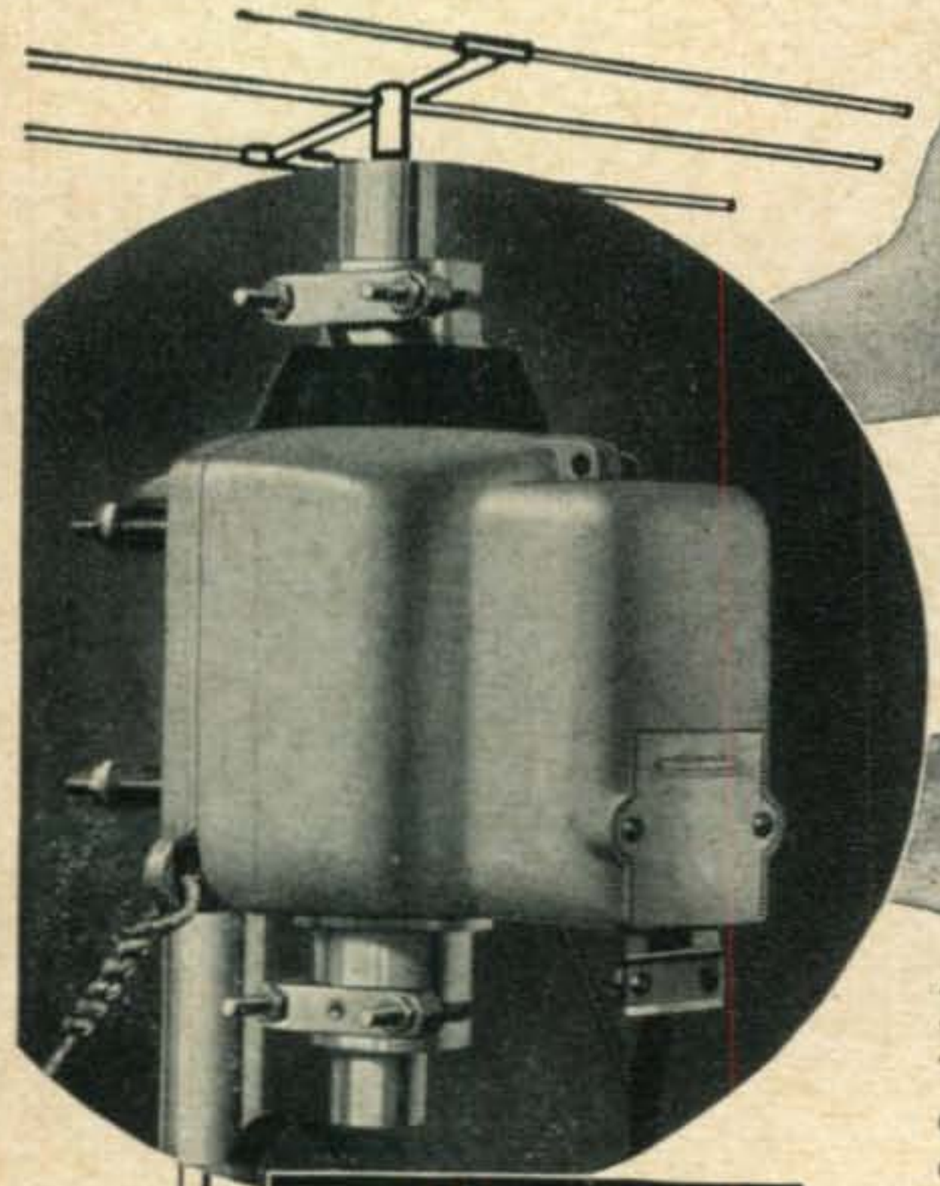
Gene, KH6PP, has been in the States for quite a spell, but is now back in the Islands and expects to be very active soon, if not already. Gene's new QTH is Box 1094, CHA #3, Honolulu.

A letter from Steve, at HC2OT, ex-W5DNN, gives us more info on what and how he does it. Steve is running 225 watts to a WRL Globe King, with a pair of V-7ODs, and a VHF-152A ahead of an HRO-7. The antenna is an all-metal array of 4 elements, stacked above his 28-mc beam. W5VV was in Rio De Janeiro in Feb. and HC2OT expects a visit from him before he returns to the States; no doubt there will be some hoisting done when they get together, and Steve doesn't mean antennas either! HC2OT says, "durn a band that can still give an old hand the shakes," for it does him, every time 6 meters opens.

On March 20, at 1325 PST, W7HEA heard the 28-mc mobile rig harmonic of CM9AA, just slightly before WØUEL worked HC2OT. Again a few CQs would have paid off—instead of just listening—more of us should take the same warning, yes??

WØUEL says the night of March 19, he worked every W5 in Texas. The next evening, the 20th, he was tuning the band at 1859 MST when he heard a terrific signal right at the edge of the band, a YL with a purty Texas drawl. Guess it wasn't the signal that made Johnny keep listening, for when she signed it was none other than HC2OT. WØUEL recovered sufficiently to grab a bottle of WØZJQ's best beer, and started frantically calling either her or HC2OT, which, he is not sure of, but the contact was made. WØUEL runs a KW to a pair of 4E27s, and is putting his beam up to 50' very soon.

Martha, W1OIR, is the XYL of W1DJ, and several issues ago we showed a picture of her new easter bonnet, the one with towers and tubes, radio that is. Well, it seems that Martha had just



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Wherever the Circuit Says

left the shack, with the receiver turned on, when W1AF worked HC2OT, on Feb. 22. Activity is on the up-grade around Boston, Martha says, with even noon-time contacts available, with W1NWL, LSN, RAI, REA, OIR frequently active. At night the 1930 EST gang meet with W1ZE, IDY, NWL and DJ. How do you like that—OIR, the XYL, operates the noontime net, while the OM, DJ, gets in on the night net. Some cooperation, eh?

The Jan. 25 aurora opening gave W2RLV the state of Vermont, when W1CGX was contacted, which Bill had been gunning for. W2RLV has been spending quite a bit of time out of town, but expects it to slack up for the Es session this summer.

Activity around Shreveport has really picked up according to W5ML, our daily MUF reporter. The gang now includes W5NXM, EKU, DC, DXB, NXM, GRY, LAX, NAL and, of course, W5ML. Most of the lads are using 3-element beams, although several have Twin 3s; W5ML going further, with an extended H and five reflectors. (Oops! This is on 144 mc, it says at the bottom of the page in small print.) The same gang is active on 6 meters also.

W8NQD has a very simple 6J6 converter for 50 mc that should appeal to those who would like to get on the band. Copies of the schematic are available by dropping him a line. W8NQD developed this converter to encourage membership in the Potlickers Net, around the Akron area. The Net is going great guns, with W8RHM and W8AGA as new members. The meeting time of the Potlickers Net has been advanced 30 minutes, to 1930 EST on Mondays and Fridays. W8LBH has a new rig with 150 watts to a T-55, 3-element Workshop beam, and VHF-152A converter, so naturally expects great doings around the megacycles this summer. (Ed. note: so do we, just wait.)

Ground-wave contacts around the Tulsa area now number 16, and the boys are warning the rest of us to watch our antenna coils when the band is open to Oklahoma. Skeds have been arranged with WØBPL in Fredonia, Kan., to see if he can join the Okla. gang. Nightly contacts are held in the order of 100 miles to Oklahoma City, Cromwell, Ada, Enid, and a relay is contemplated into W5VV or further south. Why don't you guys

---

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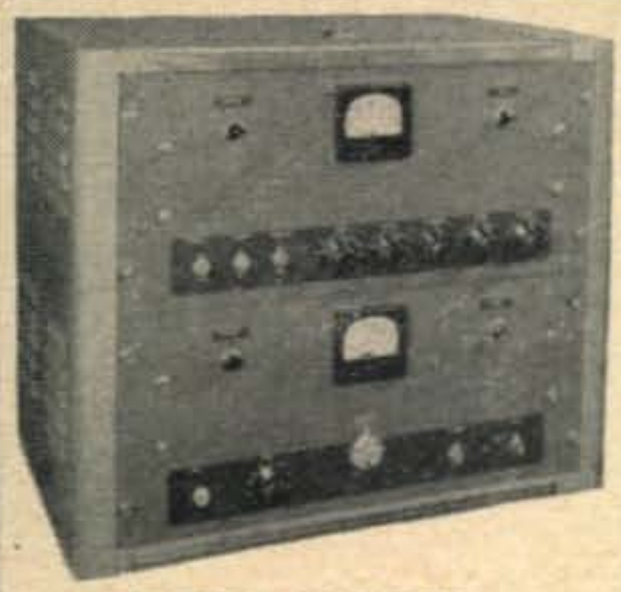

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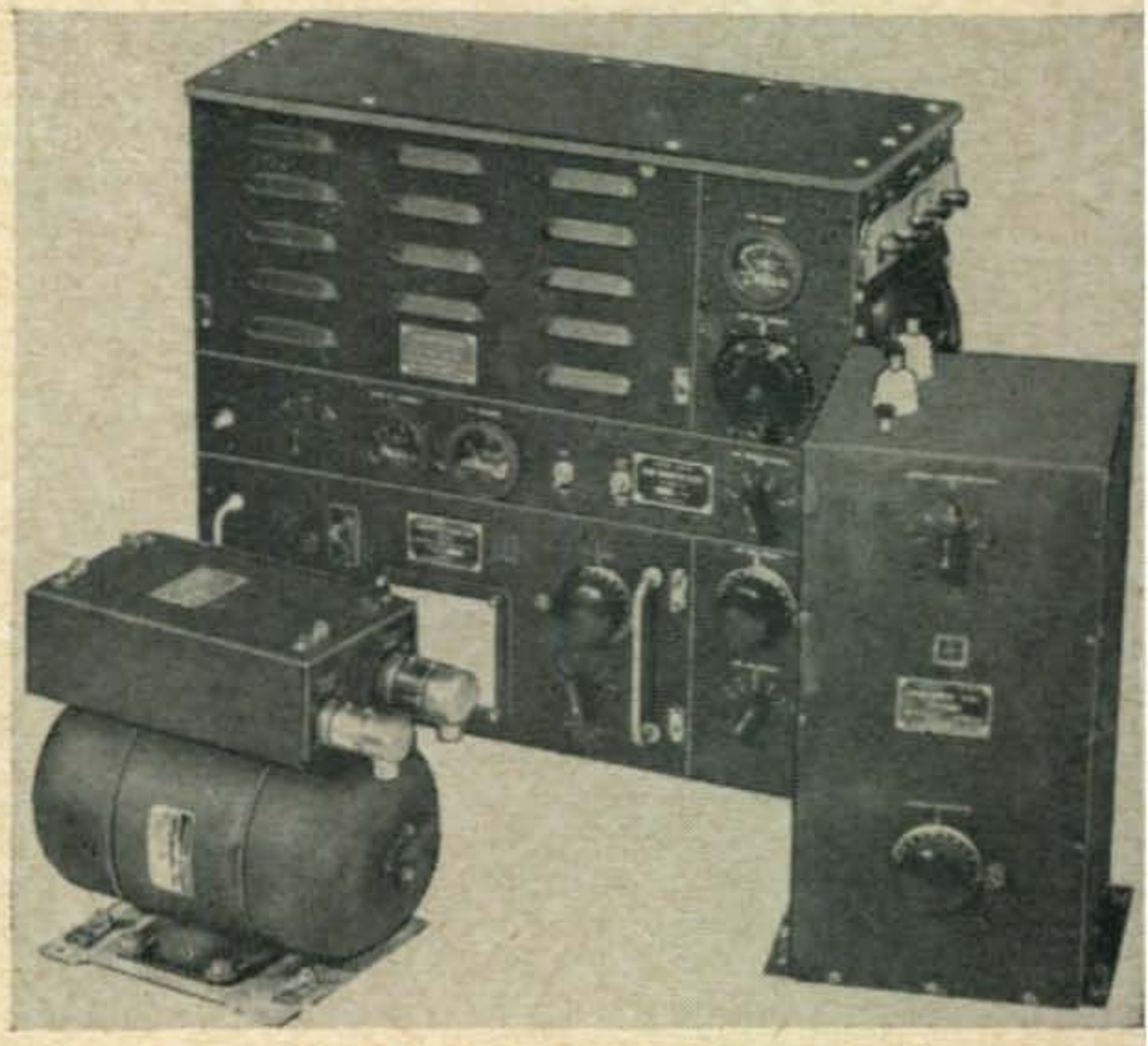

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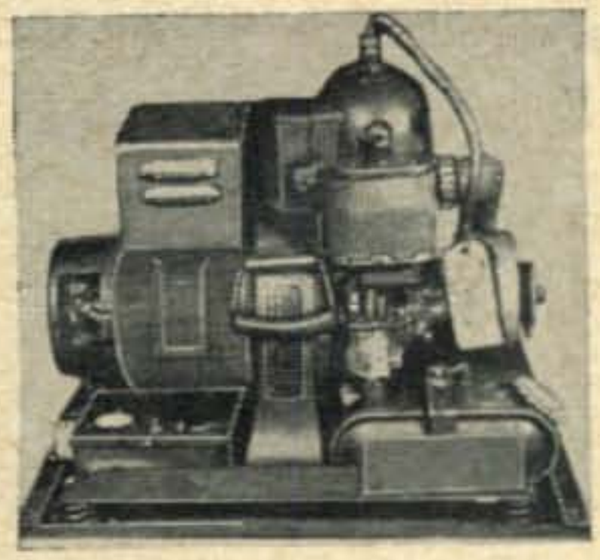

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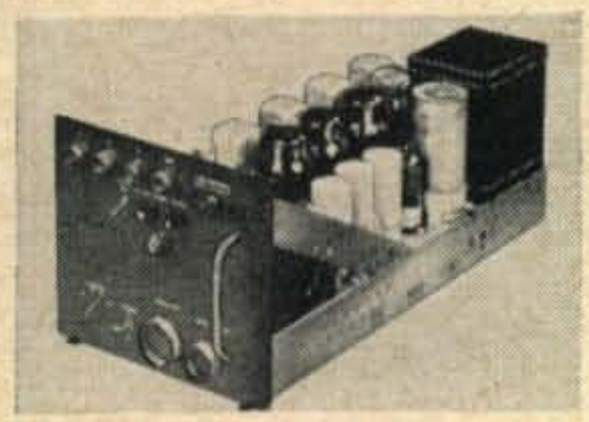

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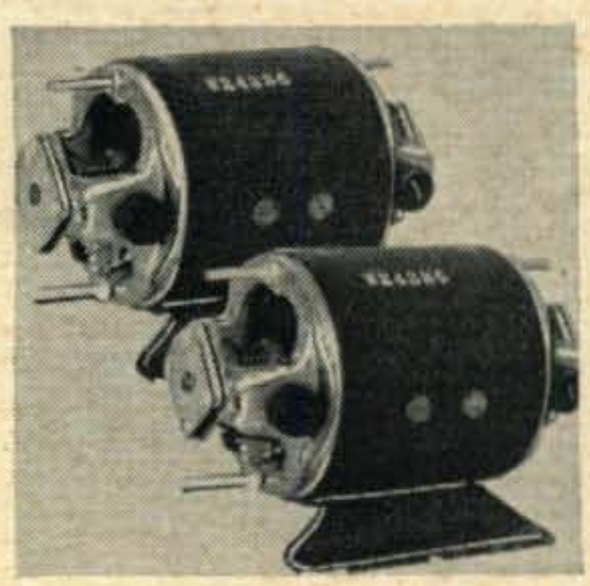

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W4JBF (top) and W8QYD try the new street sign "beam" for size.

try it on to HC2OT, nothing seems impossible in W5 territory. W5LEI also passes on this: "If everyone in the world would listen on 6 meters, they wouldn't hear nary a thing, *somebody has gotta transmit*". Now for the v-f-o fiends, if you got on 50-54 mc and swished around from one end to the other, you would cover more kilocycles than v.f.o.ing from 80 to 40 meters; geez, just think of the fun you fiends could have, so why not try it, sez W5LEI.

Harry, W9AB, had his antenna relay go bad just as the band opened for aurora on Jan 25. By the time he had it fixed the whole deal was over. The Indiana gang are just waiting for you know what, Es this summer, naturally.

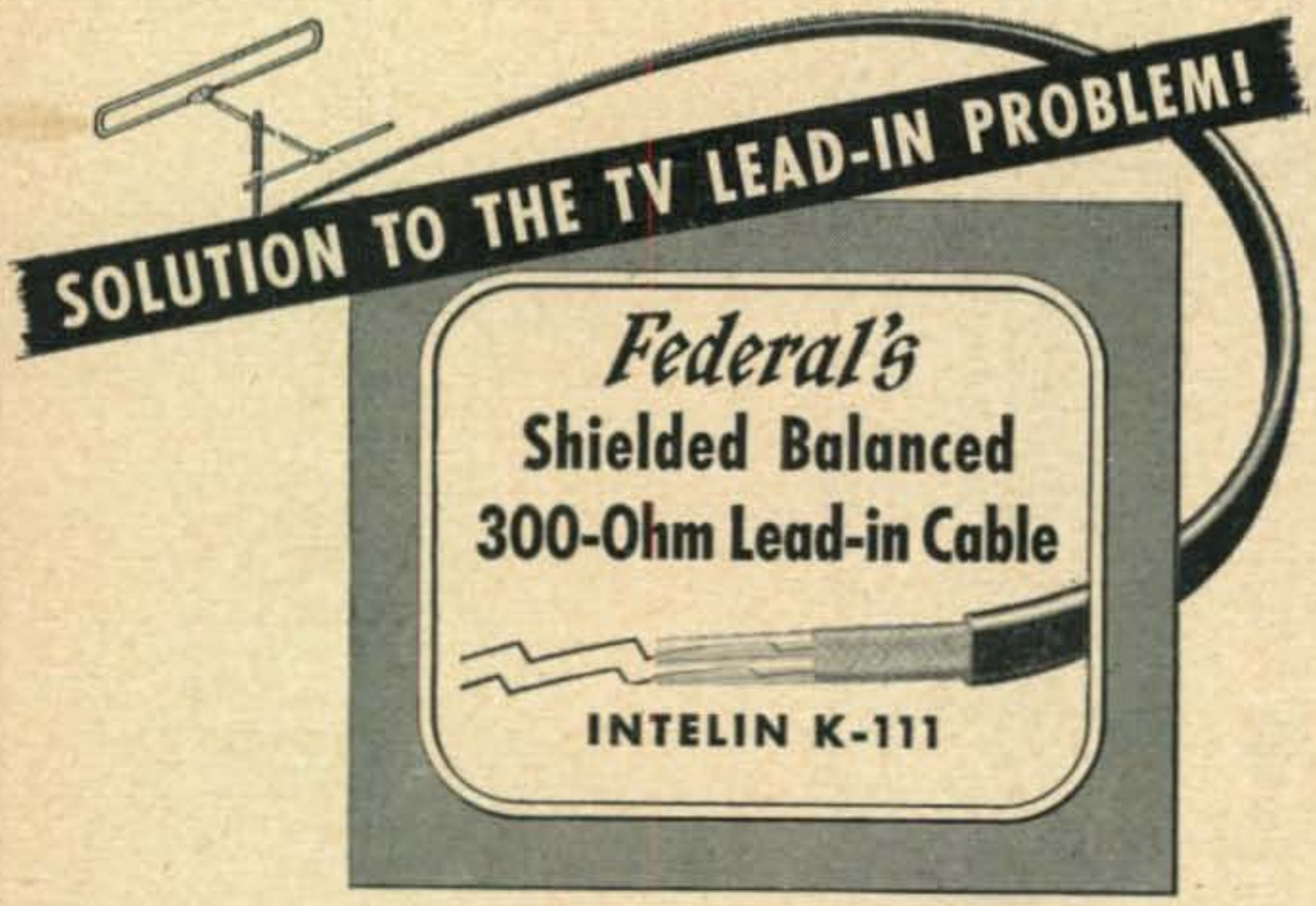
Via W9ALU, we find that W9ZHB cleaned some 10 tons of surplus and junk out of his shack, and now Ed, W9ZHB, is plagued by a room echo with all the extra space. Gad, what is he using for a transmitter, now?

W5JTI sends us a note to let us know that the stronghold of the south, Mississippi, is still v-h-f minded, although activity still isn't what it should be. Tim loaned his 829 field day rig to W5PFC, but hasn't heard him on the air with it, as yet. W5NLP is still active, and W5CQJ has an 829 rig going, but is only home on week-ends. Nightly skeds are held with W5NYH in Lexington, Miss., 50 miles north, who is running 7½ watts to a 4-element beam up 20'. W5JTI now has a new QTH, one of those v-h-f locations, so look for a booming signal from Tim.

W7JRG in Sheridan, Wyo., says that his 2-meter converter is working nicely, picking up auto QRM several blocks away. The antenna is a 24-element array in the horizontal plane. His converter is a rebuilt ARR-1, into a 522, with a BC-221 as the b.f.o.

This past winter has been the worst yet, says W9AB, even 144-mc activity was off, although in latter Feb. several nights were good for distances up to 125 miles, now activity is perking up; amazing isn't it?

Now that W5JTI in Jackson, Miss., is the State Communications Officer for C.A.P., 144-mc activity has increased. W5NYH, 50 miles north is always louder on 2 than 6 meters, although his power is higher on 144 mc. More than a dozen others are on 148.1 mc, one of the C.A.P. net frequencies. W5FFF, one of the local BC engineers, has his



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P 67	800—800 1450—1450	600 1200	300	5¾	6⅛	4	19.84
P 68	1175—1175 2100—2100	1000 1750	300	5¾	6⅛	4¼	24.99
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C-82	10	C-89	4—16	250	$5.29
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FILAMENT TRANSFORMERS

Type 940	2.5VCT @	10 Amps.	7500V Ins	$2.79
Type 040	5. VCT @	3 Amps.	2500V Ins	$2.06
Type 941	5 VCT @	6 Amps.	2500V Ins	$3.38
Type 943	5 VCT @	20 Amps.	2500V Ins	$5.29
Type 946	6.3VCT @	3 Amps.	2500V Ins	$1.91
Type 947	6.3VCT @	6 Amps.	2500V Ins	$2.79
Type 948	6.3VCT @	10 Amps.	2500V Ins	$3.67
Type 960	7.5VCT @	4 Amps.	2500V Ins	$2.35
Type 143	7.5VCT @	8 Amps.	2500V Ins	$4.12
Type 146	10 VCT @	10 Amps.	3000V Ins	$4.99
Type 961	Dual 6.3VCT @	3 Amps	2500V Ins	$3.38
Type 041	5VCT @ 3 Amps. 2500V Ins 6.3VCT @ 3.6 Amps.			$3.38

RAYTHEON VOLTAGE STABILIZERS

Positive Stabilization ±½%

Input 95-130 volts, 60 cycles single phase; output 115 volts stabilized to ±½%. *Output 6.0 or 7.5 volts stabilized ±½%.

Catalog No.	Output Cap. Watts	Net wgt. lbs.	Net Price
VR-6110	15	4	$15.00
VR-6101*	30	5	$17.00
VR-6111	30	5	$17.00
VR-6112	60	8	$24.00
VR-6113	120	14	$31.00
VR-6114	250	25	$48.00
VR-6115	500	45	$75.00
VR-6116	1000	92	$125.00

GRID DIP METER

LYSCO "DIPMASTER"

3Mc to 150Mc freq. range; calibrated dial, band switching (no coils to plug-in). Complete power supply and tubes. A really good buy @ **$33.50**

ISOLANTITE Sockets for 832's or 829's	49c
ISOLANTITE Sockets for octal tubes	08c
STEATITE Sockets for 813 and other large 7 pin tubes	73c

3C24 Triode Each 39c, 10 for $3.50

OIL FILLED BATHTUBS

Special

19c Each $10.00 per 100. All 600VDC in following sizes: .05 Mfd, .1 Mfd, 2x.1 Mfd, 3x.1 Mfd, .01x.3 Mfd

ISOLATION TRANSFORMERS

All 117 Volts to 117 Volts 60 Cy.

P-96, 40 watts.. $3.60 P-98, 100 watts $9.30
P-97, 80 watts.. $5.10 P-99, 250 watts $17.70

TRANSFORMER SPECIAL

870 volt CT @ 250Ma with 80V bias tap
5 volts @ 3 amps
2½ volts CT @ 10 amps
2½ volts @ 3 amps
6.3 volts @ 1.5 amps
115V. 60 cycle primary
} **$5.88**

If not rated 25% with order, balance C.O.D. All prices F.O.B. our warehouse New York. No order under $2.00
We ship to any part of the globe.

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75 Vesey Street — Dept. CQ 5
COrtlandt 7-2612 — New York City 7

144-mc array up 200', so if height means anything he should be doing it. The Mississippi gang is looking for signs of long haul DX this summer; so look for them, they are there.

Bill Hosington, W2BAV, of U.H.F. Resonator fame, is now convinced that 420 mc is as good as 144 mc, if high gain beams are used, with plenty of work on the receiving end. Bill uses an APT5 with 90 watts input and 30 watts output. The antenna is a vertical 32-element beam, 43 feet above salt water. W2BAV has done plenty of work on the receiver and from the sound of it, it should be a corker. Three lighthouse tubes are in the grounded-grid r-f stages, followed by a trough-line series-tuned 955 mixer; a link coupled 955 osc. tuning from 465 to 515 mc. This is followed by three stages on 55 mc, osc. and mixer, and then two stages on 15 mc. Also used is a "narrow-band throat." This is a three-stage 15-mc amplifier, using air-tuned link-coupled stages, with seven tuned circuits in all. The bandwidth of the first assembly is 5 mc, the second assembly has a bandwidth of .5 mc. Several dozen contacts have been made with W2JND 12 miles away, W2FAR and W2PHF in Larchmont, W1PBB in Stratford, Conn., 33 miles, W2NPJ at 37 miles, and W2BLF at 32 miles. W2BAV's signal has to go through plenty of trees and over 300-400 foot hills. All the 420-mc gang there would like skeds with interested parties. A regular sked is held nightly at 1900-2000 EST, on 430 mc. To check his 32 elements, W2BAV used a small parasitic beam with a flashlight lamp in the dipole, and found that it would light 110 feet in front of his array, power gain plus!

LATE MAIL

Additional Information of 6-meter Openings

March 20—W6AMD first W6 to work HC2OT from 2050 to 2140 PST.
March 21—W6AMD again works HC2OT at 1755 PST.
March 24—HC2OT reports working YV5AC, XE1FU, XE2FC and XE1GE from 2045 to 2212 EST.
March 25—HC2OT reports XE1GE, CE1AH, LU6DO and LU9MA from 2030 to 2158 EST.
March 26—OA4AE works W4IUJ, W5KSW, W5CXS, W5FSC, W5BAJ and XE2C from 1400 to 1530 EST. W5VY works HC2OT at 1500 EST. W5KSW works HC1JW and HC2-OT after 2130 EST. Reports hearing many LU signals and YV5AC.
March 27—W5KSW and W5LBG work LU9MA 2100 to 2230 EST. LU9EV, HC2OT and YV5-AC also heard.
March 30-31—50 mc opens from England to South Africa with very strong signals. More details next month.

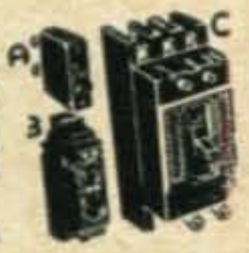
W2MWB is also looking for QSOs on 435 mc. with a new rig, receiver and antenna. Why not contact W2BAV, Wes, or have you?

The Texas lads, namely W5AJG, W5LAR and W5AJG, are now 420 mc minded, wanting to see if they can make the hop between Ft. Worth-Dallas, 40 miles.

By the time this reaches you fellows, the Es

Universal Output Xfmr Amer. Silcor, Pri; 20,000/16,000/5,000/4,000 ohms. Sec; 500/15/7.5/5/3.75/1.25 ohms. 30db. Flat to 17,000 cy. Price **$4.75**

CIRCUIT BREAKERS



"A" 50A 28VDC	79c
"A" 100A 28VDC	79c
"A" 150A 28VDC	79c
"A" 10A 24VDC	79c
"B" 3A 117VAC	$1.95
"C" 100A 3 Pole 250V	$6.95

SILVER MICA BUTTON CAPACITORS
185 mmf. ±2.5mmf 500 mmf. . ±10%
175 mmf. ±2.5mmf
Price ..... **$9.50 per 10C**

3" Oscilloscope

BC929—Indicato. using 9 tubes. 3BP1 6SN7, 6H6, 6B6G, 6X5, 2X2 (now 400 cycles) easily conv to 60cy. 115v. New Complete w/tubes plus conver. inst. and diag. **$24.9**

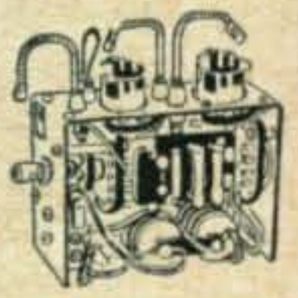
5" Oscilloscope BC704—Less pwr. supply, use 8 tubes, 5BP1, 6AC7, 6H6, incl. wooden carry. case and schematic diag. Price. . **$32.50**

BATHTUB CAPACITORS

Fig	Mfd	Volt	Term	Price
D	3x.1	600DC	3	at 33c,4-1.29
E	3x.1	600DC	3	at 33c,4-1.29
C	.1	400DC	2	at 20c,5- .95
C	2x.1	600DC	3	at 29c,3- .85
E	.025	600DC	2	at 18c,5- .85
A	2	400DC	2	at 40c,2- .75
C	.1	600DC	2	at 25c,4- .95
E	2x.25	600DC	3	at 29c,3- .85
A	.5	1000DC	2	at 45c,3-1.30
D	.1	600DC	2	at 25c,4- .95
E	3x.1	600DC	3	at 35c,3-1.00
E	.5	200DC	2	at 20c,5- .95
C	.05	600DC	2	at 21c,5-1.00
E	.5	600DC	2	at 25c,4- .95
C	.5	120DC	2	at 18c,5- .85
E	.1	600DC	1	at 20c,5- .95
E	4	50DC	2	at 25c,4- .95
E	1	400DC	1	at 25c,4- .95
D	1	600DC	2	at 30c,3- .75
C	3x.1	600DC	3	at 33c,4-1.29
E	2x.25	400DC	3	at 27c,4-1.05
D	.5	600DC	2	at 25c,4- .95
D	2x.1	600DC	3	at 29c,3- .85
D	.5	600DC	1	at 20c,3- .95
E	2x.1	200DC	2	at 20c,5- .95
C	.5	400DC	1	at 20c,5- .95
	1	100DC	2	at 15c,7-1.00
A	.02	1500DC	2	at 45c,2- .85
C	.5	600DC	2	at 25c,4- .95
C	.5	200DC	2	at 20c,5- .95
E	4	50DC	2	at 30c,3- .85
E	20	50DC	2	at 25c,4- .95
G	3x.05	300	3	at10c,10- .95

Write for Other Values in Stock

Freq. Mult. Unit
ART-13 — Xmtr Assy 2 to 18 Mc Doubling Package set up, for Two 1625 Tubes. No Coils. Complete Assy Less Tubes w/ckt diagram. Price **$9.95**



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BC-606F Metal (4x4x 2"D) Contains: Recep. Jk-34A (Phone) Jk-33A (Mike) 2000r ½w Resis. 50K ohms Pot, SPST Lum. Tip Sw Term Strip **$1.00**

CERAMICON CAPACITORS

3	mmf. . . ±5%	67	mmf ±20%
5	mmf. . . ±5%	100	mmf ±5%
4	mmf. . . ±5%	115	mmf ±2%
3.5	mmf. . . ±5%	120	mmf ±5%
11	mmf. . . ±5%	240	mmf ±3%
15	mmf ±2.5%	250	mmf —
48	mmf. . . ±2%	500	mmf
50	mmf. . ±20%		+15—30%
60	mmf. . . ±3%	1000	mmf +5%

Price ..... **$7.50 per 100**

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Mounted on steel panel for standard rack mtg. 10½" H x 19" W x ⅛" Thk. Well is 22 .. 10½" Hx19" W x 18" Thk. Well is 22" Wide. 20" Deep, affording full workings space. Grey Finish (crackle) New. Price each **$8.95**

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BD-77—Dynamotor Unit 14v in, 100v, 350 ma out with relay fuse box and filters. FOB Chicago only... **$5.75**

DM-21—Dynamotor: Part of BC-312 and BC-314. 14v in, 235v, 100 ma out..... **2.47**

PE-101-C—Dynamotor unit; 12 or 24v in. output 800v, 20ma. 400v, 135ma. 9v, 1.1A..... **2.75**

PE-55—Dynamotor unit: 12v in, 16 amp, 500v out. 200ma. F.O.B. Chicago only..... **3.75**

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DM-32A—Each 95c Three for..... **2.00**

DM-53—Dynamotor used with the BC-733. 24v. in 240V., 60ma out. New..... **2.95**

2.5-7.7 mc, transmitter tubes 2 No. 10 special and 2 No. 45

BC-604 20-28 FM TRANSMITTER

For 11 and 15 meters; can be operated on 10 meters by use of proper xtals; 10 channel pushbutton xtal controlled, with all tubes, meter, schematic, case and covers; less crystals. Used, excellent, with dynamotor—FOB Chicago only **$10.95**

BC-684 27.0-38.9 FM TRANSMITTER

Same as above except for freq. range.
New, FOB Chicago only..... **24.95**

APN-1 RADIO ALTIMETER

Complete 420 mc transmitter-receiver unit, complete with all plugs, indicators. FOB Chicago only. BRAND NEW **$34.50**

ALTIMETER TRANSCEIVER RT-7/APN-1

Frequency 418-462 mc. FM with 14 tubes including 3- 12SJ7, 4- 12SH7, 2- 12H6, 1- VR150, 2- 955, 2- 9004. 24v Dynamotor, used, in working condition..... **$7.95**

VHF DUMMY ANTENNA

Ideal unit for attachment for VHF transceiver while adjusting transmitter. 3 units hooked up in parallel will help tune up VHF transmitter. New Condition.....**3 for 95c**

SMASH VALUES IN RADIO RECEIVERS

BC-454—RCVR	NEW	**$4.95**
BC-456—MOD	NEW	**2.95**
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BC-458—XMTR	NEW	**7.95**
BC-459—XMTR	EXC.	**9.95**
BC-696—XMTR	EXC.	**14.95**

CONDENSER

2 MFD, 4000V, Pyranol.....ea. **$ 2.95**
4 for **10.00**

PE-117 UNIVERSAL POWER SUPPLY

6 or 12 v input; out. 145 v and 90 v. less, vibrator, voltage, regulator and rectifier tube; ideal mobile power supply unit; excellent condition. FOB Chicago, only. each..... **$2.95**

SCR-283 40-80 METER XMITTER

New equipment: Transmitter-Modulator and coil sets to cover 2.5-7.7 mc, transmitter tubes 2 No. 10 special and 2 No. 45 special, receiver (less the receiver coil sets), receiver tubes 1—37, 1—38, 4—39/44, shock mounts, dynamotor, antenna switching relay, receiver control box, transmitter control box, charts, dials, and instruction book.
What a sweet buy! Only..... **$9.95**

BC-709 INTERPHONE AMPLIFIER

Ideal for aircraft, booster for telephones, etc. FOB Chicago only **$3.49**

SURPRISE PACKAGE

20 pounds assorted radio parts. A $25.00 value for only **$1.95**

R-89 ARN-5A

Glide path receiver. Crystal control of local oscillator. 332-335 mc, complete with relays, 7—6AJ5, 1—12SR7, 2—12SN7, 1—28D7, and 3 crystals: 6497 kc, 6522 kc, 6547 kc. 90-cycle band pass and 150-cycle band-pass filters, excellent for making an intermodulation checker. Beautiful cabinet and chassis as foundation for many interesting experimental and construction projects. Broad pass band on 20.7 mc IF's ideal for television. Schematic furnished, less covers.
Used, excellent, Only..... **$ 3.95**
New **12.95**

EE-8 ARMY FIELD TELEPHONE

Sturdy, highest quality telephone at less than price of a better-class toy. With ringer. Requires only two flashlight batteries for each phone and two wires between each phone. Excellent condition. Used. Each..... **$7.95**

GEARED TUNING DIAL

5 band, vernier. Freq. range from 3.2 to 32 mc. BRAND NEW. Ideal for many applications. An excellent buy **$1.39**

APS-13 UHF ANTENNA

Suitable for 400 mc citizen band, ideal for UHF experimenters. With director and reflector elements mounted. BRAND NEW. 2 for **$1.49**

BC-620 TRANSMITTER-RECEIVER UNIT

FM transmitter-receiver, crystal controlled, two channels, freq. range 20-27.9 mc. 13 tubes, dual meter for testing filament and plate circuits. Used, good..... **$9.95**

VHF TRANSCEIVER

Ideal substitute for SCR-522, freq. range 140-144 mc, crystal controlled, 10 watts. The receiver section has two individual RF sections, feeding a common 3 stage 10mc IF amplifier. Both RF sections may be operated simultaneously, or either one individually. The receiver unit has 13 tubes. The transmitter is of straight forward design. Transmitter unit has 7 tubes, one No. 832 as final modulated by a pair of 6L6 and push-pull. Complete unit in case with tubes, crystals and diagram less dynamotor. EXCELLENT CONDITION..... **$14.95**

SPECIAL!
WESTINGHOUSE TRANSMITTER BC-122

Freq. range 325 to 800 Kc; in portable field case; 3 meters plus excellent parts (less tubes)—An Excellent Buy—BRAND NEW..... **$7.95 ea.**

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session should be in full swing. Don't forget, we need any and all reports, no matter how large or small the opening is. Thanks.

Hamfests

Horsetraders' Shindig

The v-h-f Horsetraders have planned a "shindig" for Sunday, May 8, at 1 p.m., to be held at The Suburban, located on Route 4, North Hackensack, N. J. Registration will be $3.00 and includes choice of turkey or roast beef dinner. All reservations should be made by May 1 to Duncan Scott, W2-LAL, 1254 Beaumont Ave., West Englewood, N. J. All the v-h-f gang are invited.

Rochester, N.Y., Hamfest

The Rochester Amateur Radio Assn. Hamfest will be held on May 14 at the Powers Hotel in Rochester. Registration at 2 p.m. Special program for the ladies. Tickets $3.50 in advance, or $3.75 at the door.

Golden Empire Club Hamfest

The third annual summer hamfest of the Golden Empire Radio Club of northern California will be held in Chico, Calif., on Sunday, June 26. Registration at $1.50 includes program, prizes, entertainment and dutch lunch. Early registration and information requests should be forwarded to W6-GUV, P. O. Box 19, Chico, Calit.

Amateurs Receive Expression of Gratitude

In the first session of the 81st Congress Representative Frederic R. Coudert, Jr., of the 17th District in New York, offered a resolution to express the gratitude of the House to amateur radio operators, the resolution having been referred to the Committee on Interstate and Foreign Commerce. The proposed resolution reads:

Whereas amateur radio operators serve the Nation in war and peace; and

Whereas amateur radio is a hobby involving the sending and receiving of messages by code or voice without pecuniary gain; and

Whereas the right to practice that hobby is granted only to those who have passed an examination given by the Federal Communications Commission; and

Whereas such amateurs have aided in keeping the lines of communication open during floods, storms, and other disasters, and so helped in the rescue of life and property; and

Whereas amateur on ham radio has provided a reservoir of self-trained operators for national defense; and

Whereas amateur radio has through research and experimentation enriched the radio art, the products of which are enjoyed by all citizens; and

Whereas several thousand of such licensed amateurs live in the United States of America and its possessions: Therefore be it

Resolved, That the House of Representatives of the United States, on behalf of a grateful citizenry, expresses its gratitude to radio operators of amateur standing for their service both past and present.

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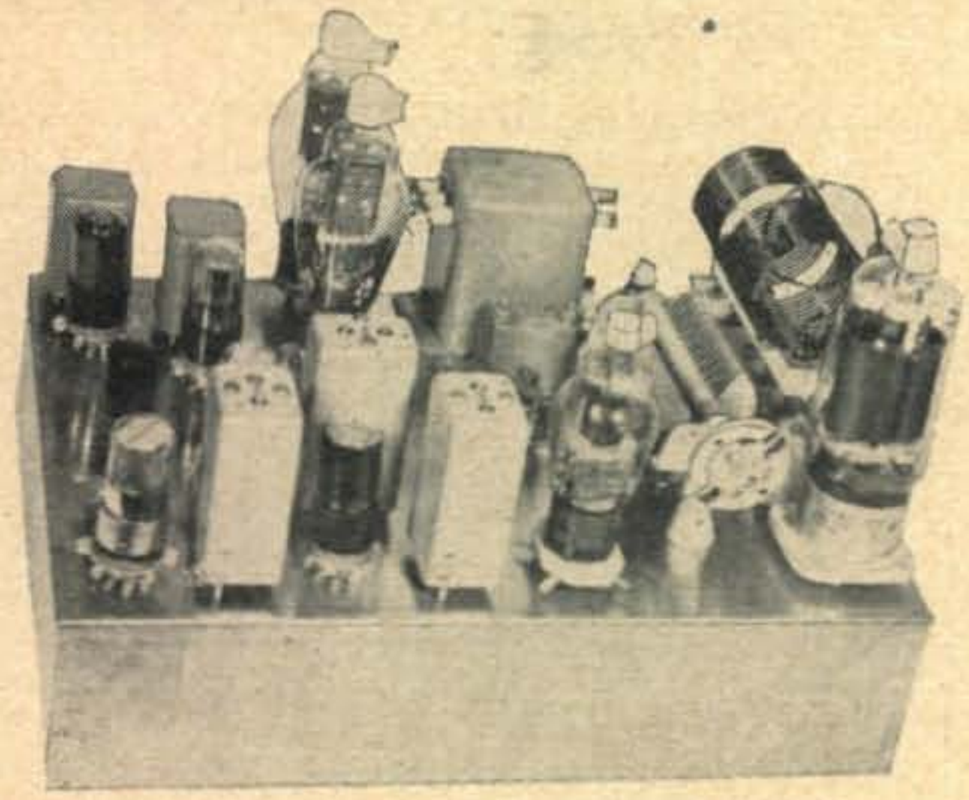

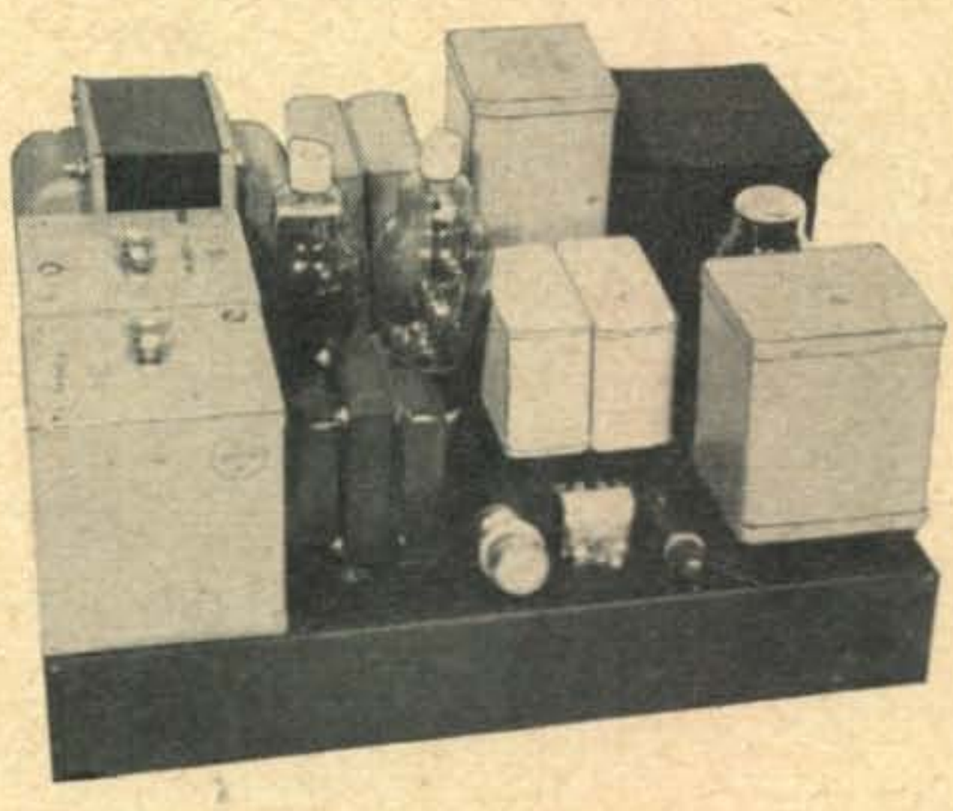

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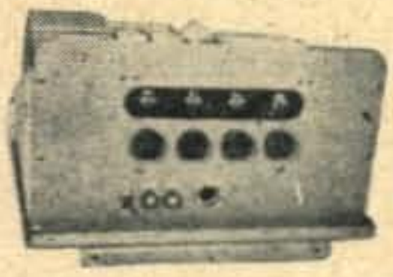

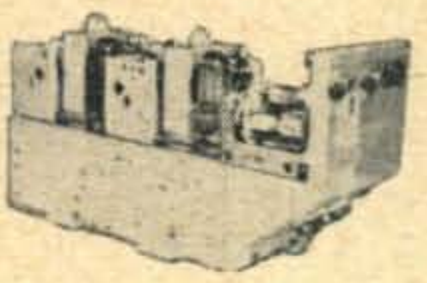

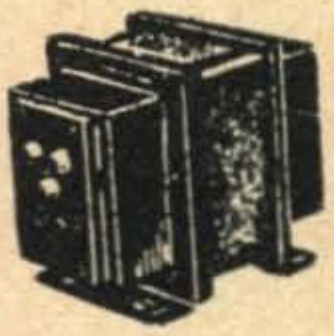

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FAMOUS 1068/1161A high freq. receiver. 14 tube high gain, 2 rf stages, 5 stages IF, 4 mc IF band width suitable for TV, internal AC supply. Simple change for 2 meter use. Conversion latest Radio Handbook.....**ONLY 29.50**

ARC/5 HIGH FREQ. TRANSMITTER—1625 xtl, 1625 mult., 832A mult. 832 final. Ideal 2 meter rig, 6 and 10. Motor turret band switch, perfect for 4 band remote operation. Nothing finer for mobile use and superior to 522. 6x12x8, 6 lbs. With tubes.....**ONLY $17.50**

HIGH POWER VHF—2 meter PP35Ts, heavy silver plated variable inductor. An efficient complete final that runs several hundred watts with only few watts grid drive. Has 110vac, 400 cps, 2000 vdc 300 ma. power supply and exceptional parts, tube blower etc. Type AM 18/APT. Less tubes...**PRICE $15.00**

BEAM MOTOR—Heavy duty prop reversible, 24-35v dc or ac, 3/4 rpm, with conversion sheet.....**$12.95**

POWER SUPPLY EQUIPMENT

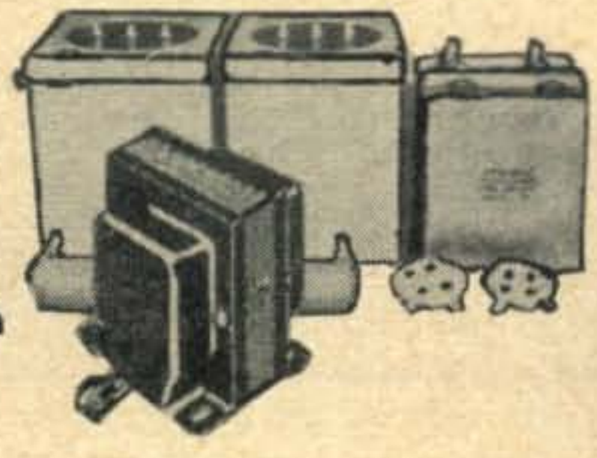
POWER HOUSE "SPECIAL" 7400 vct @ 500 ma. HD transformer. Provides 3000 vdc @ 500 ma., choke input. Nicely cased in two tone grey and black.....**PRICE $59.00**

THE 1KW "STANDARD" 5000 vct @ 500 ma. Gives a perfect 2000 vdc at 500 ma., choke input. Similar to "SPECIAL" except for size. 6¼H x 5¾W x 11½L.....**ONLY $39.50**

HV SUPPLY KIT—Provides 1500 vdc or 1250 vdc at 350 ma. Includes HD plate transformer 3600 and 2800 vct, 2 chokes 6 hy @ 350 ma., 2 oil filter capacitors, 2.5v @ 10A trans. 10,000v, bleeder, light assembly, socket and small parts. A husky matched supply of commercial quality, in neat two tone grey and black.

ONLY $29.50

PLATE TRANSFORMER—as used in above KIT. **PRICE $17.50**



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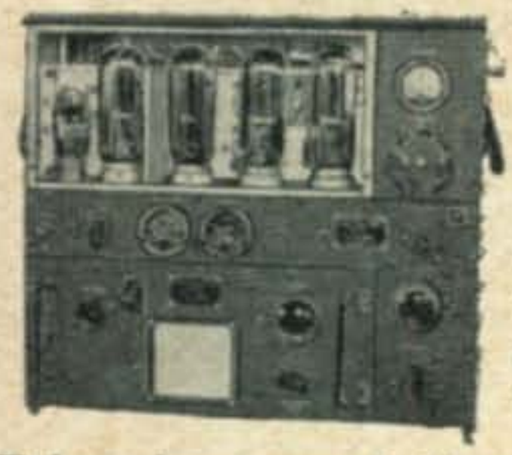

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Cost to you with tubes and tuning unit **$12.95**

Take advantage of this offer to obtain one of the best values in Government Surplus available. The three front panel meters alone are worth the price you pay. In addition, all the fine condensers, coils, temperature compensated tuning coils and condensers, high speed ceramic keying relay. High priced fittings and sockets.
You'll have a rig to boast of when you see this fine transmitter. Developed by the Army Signal Corps to provide dependable communications under adverse conditions.
Shipped with 4- 211's and 1- VT-25. Immediate shipment from stock.

FOR FULL CONVERSION INFORMATION
SEE PAGE 26

A PLATE SUPPLY FOR BC-375 ABOVE

Puts out 1000 V DC @ 350 MA. Input requires 12 V DC. Remote starting relay for mobile rigs. Filtered output. Type BD-77. Manufactured by GE. Like new..... **$8.95**

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SOUND POWERED HANDSET

No Batteries Needed!
No Power Supply Needed!

Our Price Only **$9.95**

TALK UP TO 25 MILES

High fidelity speech transmission. Ideal for emergency or convenience applications. Operates up to 25 miles with #16 twisted wire; up to 15 miles with #19. And no auxiliary power needed. Also operates over single wire with ground return. As many as 12 handsets can be operated in communication systems for group conversations. Explosion proof. No fire hazard. No spark is generated. Guaranteed one year by Wheeler Insulated Wire Co. (Div. of Sperry Co.) Shipping weight 3 pounds. Immediate delivery. (add 30¢ postage to above price.) *Write for bulletins on radio and tool items.*

ABELL DISTRIBUTING CO.
Dept. Q-5
5 E. Biddle St., Baltimore 2, Md.

DX

(*from page 46*)

ET3AB on the air. He contends that this new one is not legal since the Ministry of P. and T. in Ethiopia does not reissue call signs. Golding cancelled his license on November 10, 1948. OM Golding also says he will be very happy to QSL any who have not received his card, providing the ET3AB worked was before November 10th of last year. He also mentions that he would like to correspond with someone, a ham, SWL, or, for that matter, a YL, if they are interested in ex-

W. A. Z. Honor Roll

To enter the Honor Roll, fill out one of the Zone and Country List forms which we will supply on request. Please send a stamped, self-addressed envelope.

The Honor Roll contains totals of postwar contacts only, that is, contacts made since November 15, 1945.

It is not necessary to submit confirmations until you are eligible for a W.A.Z. certificate. To be awarded a W.A.Z. certificate, send confirmations for the 40 zones direct to the DX Editor, as well as a list of these 40 confirmations giving the call letters of the station, date and time of the QSO. You can again use one of our standard Zone forms for this. It will become our permanent record of your W.A.Z.

Those applying for W.A.Z. awards and not having been previously listed in the Honor Roll, submit your list of zones, as well as the 40 confirmations, and a Country List.

The Honor Roll is in two divisions; the c.w.-phone section, which gives the current total of zones and countries any station has worked while using c.w. or phone, or both; the other section contains a list of "phone only" stations. All contacts claimed in this section must be on a "phone-to-phone" basis.

All-time W.A.Z. certificates will be issued upon presentation of proper confirmations. The certificate will be similar to the postwar certificate, although no listings of all-time W.A.Z. certificate holders is anticipated at this time.

One of the most active stations in Trieste, this is the up-to-date operating position of IIMV.

changing ideas on radio, etc. Here is his present QTH: S. Golding, No. 7 Pretoria Road, Southsea, Hampshire, England.

What do you do with a guy who insists upon rubbing it in? Take a look in the magazine *Time*, dated February 28, on page 62, and you'll get what I mean. At any rate, possibly 10,000,000 readers know that W2IOP has worked UO5AD. Hmmph!!

W2EMW works in the post office in Syracuse and explains why he doesn't get up around seven or eight o'clock in the morning to lay for that much needed VQ8 contact. You see, it's like this. He works at the P.O. from 3:30 p.m. until midnight, and when he gets home, he pounds brass until about four or five a.m., then hits the sack. Now do you understand why he doesn't get up at 7:00 a.m.? I do.

W2NYC, who was the "Bill" at *ZC6UNT*, is back in the States and wants it known that he has QSLd all the contacts he personally had while in Tel Aviv; however, just in case you didn't get yours from him, you can request a duplicate by writing to him. The Call Book QTH is O.K. Bill says all operators QSL their own contacts.

W7LNG is doing quite well on 40 in working *UAØFB, UAØFJ, UAØFL, OX3BC, KP6AB, ZM6AA, KM6AK, KR6NA, KX6BE*, and a few others . . . Received a note from W6YNK from Bangkok, Siam, and Howard says that since he haywired enough junk together to get on the air, his DX has come pretty easy. In about three months' time, he has worked around 100 countries

ANTENNAS FOR ALL USES:

TELESCOPING ANTENNA WITH BASE INSULATOR: Four section, steel, extends 6'2" to 23'6". Diameter taper from 1-116" to ½". Each section fitted with adjustable locking clamp. Can be adjusted to length required for freq. Brown glazed base insulator and stand off. (Illustrated at left). Price.....**$12.95**

WHIP ANTENNA FOR MOBILE AND STATIONARY USE

MP-48 Mast Base Mounting with heavy vertical Coil Spring, insulated at top to receive Mast Section MS-53. Mast Base only.....**$2.95**

MAST SECTIONS: For above MP-48, tubular steel, copper coated, painted—in 3 foot sections. Bottom section MS-53 can be used to make any length. MS-52-51-50-49 for taper. Screw-in type. Any Section. Price; Each.....**$ .50**

WHIP STEEL-24 ft. two piece. Bottom section 4 ft. long. Taper ¾" to ¼". Bottom Sec. threaded ½". Price.....**$2.50**

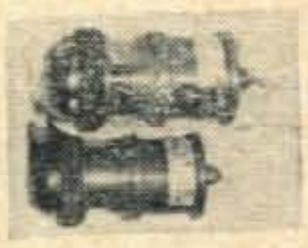
TELESCOPING STEEL ANTENNA—3 Sections, 94" long. Telescoped 40". Size ¾" to ¼". Price.....**$1.75**

ANTENNA ROTATOR:—Ideal reversible motor for rotating all types of antennas at the top. Weighs only 4½ lbs. Size 7½" L. less shaft. Gear box and Mtg.: 4⅝" x 3½". Motor size: 5" L. x 2¼" D. Shaft size: ⅜" x 1½" threaded. Operates from 24 V. DC, 2 amps. 4.5 RPM or 36 V.A.C. Torque: 70 lbs. per inch. Price..**$8.95.** Transformer for above..**$2.95**

SELSYN TRANSMITTER & INDICATOR SYSTEM

Ideal as radio beam position indicator for Ham, Television, or Commercial use. Complete with five inch I-82 Indicator, Autosyn Trans., 12 Volt 60 cycle Transformer, and wiring instructions. Price — New:.....**$9.95**

SELYSN 2J1G1—Can be used as position indicator for antennas; 110 Volt 60 cycle, with instructions. Normally operates from 57.5 Volts 400 cycle. Price per Pair.....**$3.00**



SELSYN No. C-78248—115 Volt AC 60 cycle. Size V 3½" x 5½". Can be used to turn small antennas or for position indicator systems. Price per Pair....**$5.95**

MOTORS:

6 or 12 Volt AC-DC Heavy Duty reversible motor with 5/16" x 7/16" shaft. Price.....NEW: **$2.95**

6 Volt AC-DC Motor—Ideal for auto fans, models, etc. Shaft ¼" x ⅞". Used—Tested.....**$1.50**

HIGH TORQUE MOTOR FOR ANTENNA ROTATION:

¾ RPM; operates on 110 Volt 60 Cycle with 10 MFD condenser; normally 110 Volt 400 Cycle, reversible. Instructions included. Size 4¾" x 4". Price **$2.95;** 10 MFD Cond. only **$1.00.** Reversing Switch at **35c.**

DYNAMOTORS:

INPUT:	OUTPUT:	STOCK NO.	PRICE
12 V. DC	220 V. 100 MA	D 402	3.95
12 V. DC	440 V. 200 MA	D 401	7.95
12/24 V. DC	440 V. 200 MA & 220 V. 100 MA	D-104	9.95
12/24 V. DC	F/No. 19 MARK II	P/S No. 3..	9.50
13/26 V. DC	F/BC-645	PE 101	2.95
12/24 V. DC	500 V. 50 MA	D 0515	2.95
28 V. DC	F/Comm. Receivers	DM 32	1.95
14 V. DC	230 V. 100 MA	DM 20	3.95
9 V. DC	450 V. 60 MA/with Blower	D 9450	3.95

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NEW TRANSFORMERS and CHOKES

TRANSFORMERS—115 V.A.C. 60 CYCLE INPUT:

OUTPUT: 750-0-750 V.A.C. (600 V.D.C. after choke input filter at 2.50 MA.) Includes 6.3 V.A.C. winding at 5 amps and 5.0 V.A.C. winding at 4 amps. CH-106.....**$7.95**

OUTPUT: 625-0-625 V.A.C. (500 V.D.C. after choke input filter at 250 MA.) Includes 6.3 V.A.C. winding at 5 amps and 5.0 V.A.C. winding at 4 amps. CH-107.....**$7.35**

OUTPUT: 600-0-600 V.A.C. at 250 MA. 12 V.A.C. at 3 amps; 12 V.A.C. at 3 amps; and 5 V.A.C. at 3 amps. Designed for Army surplus transmitters. CH-108.....**$6.90**

OUTPUT: 250-0-250 V.A.C. at 60 MA. 24 V.A.C. at .6 amps; 6.3 V.A.C. at .6 amps. Designed for Army surplus Receivers. CH-109.....**$3.00**

OUTPUT: 6.3 V.A.C. at 6 amps. CH-110.....**$2.25**

OUTPUT: 24 V.A.C. at 2 amps. CH-111.....**$2.25**

CHOKES:

CH-115—8 Henries at 500 MA. filter choke, 5,000 volt insulation.....**$8.67**

CH-116—5-20 Henries at 500 MA. swinging choke, 5,000 volts insulation.....**$8.37**

All Above Items Are Brand New—Not Surplus! Write for List of High Voltage Transformers and Chokes!

TRANSFORMERS—110 VOLT 60 CYCLE PRIMARIES:

Sec. 12 V. 1 amp....**$1.50** Sec. 24 V. .5 amp...**$1.50**
Sec. 24 V. 1 amp.... **1.95** Sec. 36 VAC 2.5 amp. **2.95**
Sec. 14-14 or 28 Volt—7½ or 15 amp..... **4.95**

COMMAND RECEIVERS:

BC-454 3 to 6 MC. USED.....**$5.95**
BC-455 6 to 9.1 MC. USED..... **6.95**
DYN-64 Can be used for Comm. Rec. No. 0515..... **2.95**
TRANSFORMER NH-109 for Comm. Rec.—110 V....**3.00**
TRIPLE REC. RACK—black..... **1.50**
TUNING CRANK or Knob..... **.65**
BC-442 Ant. Relay Box w/cond. New: **$2.95** Less Cond **1.95**

COMMAND TRANSMITTERS:

BC-458 5.3 to 7 MC New: **$8.95** .....USED: **$5.95**
T/20 ARC-5 4 to 5.3 MC. NEW: **$9.95**....USED: **6.95**
BC-456 MODULATOR—Like New..... **2.50**
DUAL TRANSMITTER RACK—New..... **1.50**
TRANSFORMER NH-108 for Comm. Trans..... **6.90**

AC POWER SUPPLY AND SPEAKER:

Completely wired power supply and speaker with volume control C.W. and on & off switch, housed in metal cabinet. For command receivers with connections to plug into receiver and 110 Volt 60 cycle line. Voltage output: 250 V. 60 MA., 6.3 V. and 24 V. Price: Completely wired **$14.95** Kit of Parts **$9.95**

INVERTER MG-149 F—Input 24 Volt DC; Output 26 Volt DC, 250 VA 400 cycle, or 115 V. 400 cycle 500 VA. Appear to be unused; are refinished and Tested. Price **$14.95**

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TU-17 or 25 for BC-223—Price: New.....**$4.50**
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Cable for BC-223 w/PL-150 each end..... **1.75**
Cable for BC-375 w/PL-61 each end..... **1.75**
Cable for TCS EQ/65F7, 65F10, or 65F13..... **2.95**
Plug for 1-82 Indicator PL-118..... **1.00**
Plugs for LP-21 Loop, PL-112, or PL108..... **1.00**
PL-8 Filter 1200 CPS..... **1.95**
BC-1023 Marker Beacon Rec. with tubes..... **3.79**
BC-301 Marker Beacon Rec. Less tube..... **1.95**
BB-54 2 Volt Dry Cell Battery..... **1.50**
BC-778 Gibson Girl Receiver—Only..... **4.95**
CD-365 Cord for LP-21 Loop..... **1.50**
GN-45 Generator..... **6.95**
Circuit Breaker—115 V. 60 cycle 12 amps..... **1.75**
Circuit Breaker—24 VDC 30 amp..... **1.00**

FAIR RADIO SALES • • 132 SOUTH MAIN ST. LIMA, OHIO

Bud Bane, W6WB, trying his hand on a rare one.

on c.w. He says he only wishes they would count for DXCC, as well as the 40 zones he has worked toward W.A.Z. Naturally, you can't count any of your contacts with him while afloat as a country. However, at the time of dropping me this note, he was taking the rig ashore for one or two days for the express purpose of giving any of those he could work a contact with Siam.

W6ZZ says the first week-end of the recent phone contest nearly finished him, as he called his heart out at *LX1JW* . . . VE3ZM, who operates 10 phone, is unhappy at not receiving a card from his only Russian contact, *UK5BAG*. New ones recently worked are *SVØWF, VP8AD, TA3GVU*.

KA1AI (DU1AI) will be back in the States around the first part of April and will again operate under his old call W7JKJ. Stan says *KA1ACF* is now at W7HUI in Portland, and *KA1JM* has also returned to the States. The only station on the air at Clark Field is that of Pete Vargas, *DU1AK*. Incidentally, a club was recently organized there, known as Clark Amateur Radio Club, the president being Capt. Owen Blankenship, W5LF1, ex-DU1OB—KA1ABX.

ZL2GX is worrying about his next power bill after spending so much time calling *FE8AB, FF8GP*, and *FD8RG*. W6IFW finds that a new 3-element beam and a 4-250A final help a lot in adding a mess of countries. In true contest spirit, the final was completed and high voltage first applied about an hour before the contest opened up. Seventeen new countries were added . . . ZS2X says that *ZS9D* is active on phone and c.w. using the low edge of 14 mc for the latter.

VQ8CB will be returning, shortly, to Mauritius. Then, too, don't forget *VU7AF* in Nepal is fairly active on 20 phone, as is *C3EA*. *W3ORD/C3* is on c.w., mostly week-ends.

W7OY is an old-timer having held 9ON, 9OY, and 9OG. He is now going after the stuff again. He is using a Mims beam 85' up in the air . . . Ken Neifert, KB6AD, is now located in Honolulu. Ken wants it known that he has about 1100 QSL cards unanswered, and will get around to sending them out just as soon as it is practicable. Due to circumstances, he hasn't been able to keep them up to date, so please be patient.

KH6VP/VR4 has been sending out his QSL cards during the past few weeks for all contacts made while he was on Guadalcanal. Bill had 889 QSOs in 85 hours of operating time. It would be putting it mildly to say that Bill got the thrill of his life when he first tossed out a CQ and then had the whole band fold in on him. Putting it in his own words, "The first W I was able to pull out of the throbbing mess was W4CYC." Bill was the only operator, but he could not have gotten the station going without the good help of Doc Snyder, Lewis Anderson, Ed Auzin, and Bob Wentworth. Who knows? . . . maybe Bill will take a jaunt to another out of the way place one of these days. We can hope anyway . . .

Some of the boys phoned in saying they have been working *AC4RF* on c.w. at about 14,030. W6SA passes along a comment made by G3DYY

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REC. & XMTR.

BC 454 (new) 3 to 6 mc. BC 454 or ARC5, 4 to 5, 80 mtr. (slightly used) with schematic.
BOTH FOR **$8.95**

BC 459. 7 to 9.1 mc. (new)	$14.95
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BC 459 7-9.1 mc (used)	9.95
T22/ARC-5 7-9.1 mc (new)	12.95
(used)	9.95
T20/ARC-5 4-5.3 (used)	4.95
274-N Type Trans. 2.1-3 mc (used)	5.95
BC 453 190-550 kc. (used)	9.95
BC 454 3-6 mc (new)	5.95
(used)	3.95

SELSYN XMITTER & INDICATOR

Ideal as Radio beam position indicator for Ham, Television or commercial use. Complete with I-82. **$4.95**

BC 455 6-9.1 mc (used)	5.95
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(used)	12.95
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ARN-7/BC 433 Recvr 150-1750 mc. continuous (used)	14.95
ASB/7 Indicator Unit with Tubes (exc. basic unit for 5" scope) (used)	14.95
Spare set of Tubes for Command Recvr or Xmtr. Specify which set	$1.29
Dynamotor 6 volts DC—300 volts DC 85 ma.	$4.95
PE-103 Dynamotor 6-12 volts DC—500 volts DC 160 ma (new complete with base)	$14.95
(new without base)	7.95

SCR-522 TRANS. & REC.

Like New **$39.50**
BC 375 Tuning Unit.
New $2.45

FILAMENT TRANSFORMERS

110 volt 60 cycle primary.	
12—24 volt at 2 amp.	$2.95
5V-24V 30 volt at 20 amp.	3.95
6.3 volt at 6 amp.—5 volt at 3 amp. 33 volt at 150 ma.	1.95

who is ex-VS9ET. Any of you fellows who have not received a card from *VS9ET*, please write an airmail letter to G3DYY telling him about it, and he will be glad to send a card by return mail. Naturally, it is necessary for you to have worked him!

W3AYS has shoved off from Baltimore and will open at Dayton, Ohio. He says that until he can find a place in the country, he will be temporarily operating with 30 watts . . . VK4RC is a little griped because every W1 he worked in the contest was either in Connecticut or Massachusetts. He was itching to get one of them in Vermont, as that's what he needs for W.A.S.

KH6LF, also W4INV, is no more. Mac is now located in Riverside, Calif., so probably will be popping up with a W6 call one of these days. He says he still has a few QSL cards left from his *KH6LF* station, and any of you who have worked him and have not received a card, may get one if you will first send him one of yours.

PY1DH thinks maybe sometimes he talks too much, and possibly should be what he calls, "zip mouthed." Don't know exactly what he means, but maybe you do . . . W6PB says he got a thrill for a moment out of working *EZ4BB*. Dan has added eleven new ones, making 175C . . . By the way, a number of you fellows have mentioned about *SP5BA*, and we have been informed that you should QSL via W5KC. This is all very good, but the last we heard, W5KC didn't know anything about it; however, it may be cleared up by this time. I can't help it! . . . That's just what they tell me.

Now that you have plowed through this column, you can put the magazine away and work some more DX. (Really, Larry, I don't mean it.) It's about that time of year again when I make the annual trek into W9 land to attend the Radio Parts and Electronic Show at the Stevens Hotel in Chicago. If any of you fellows can make it to the Stevens between May 16th and 20th, it would be good to get together, and maybe we can park an elbow on the mahogany. 73.

DX QTHS

AG2AB	Hqtrs. Co. 351st Infantry, APO 209, c/o P.M. New York
C3EA	APO 917, c/o Post Master San Francisco, California
CT1AC	Antonio Faria, Terreiro do Trigo, 16-1, Lisboa, Portugal
HL1CR	APO 917, c/o Post Master San Francisco, California
HZ1HZ	Ahmed Zaidan, Mecca, Saudi Arabia
I1YAT/Trieste	Apiari St. TR1, Trieste
KA1AI or DU1AI	General Delivery, Phoenix, Oregon
KB6AD	K. G. Neifert, Kauai Telephone System, Lihue, Kauai, T. H.
KG6FA	Box 100, Guam
KG6IB/Iwo Jima	U. S. Coast Guard, APO 264, Unit 1, c/o P.M. San Francisco
KH6LF	Capt. C. H. McInnis, Jr., 506th Tac Control Sqdn., March Air Force Base, Riverside, Calif.
KM6AG/KW6	C. A. A., Wake Island
KS4AL	Swan Island, c/o P.M. Tampa Florida
KX6BA	Navy 3234, c/o FPO San Francisco, California
MD4JG	P. O. Box 1313, Nairobi, Kenya Colony, South Africa
MI3AB	Via A.R.I.
MT2FU	B.O.A.C. Tripoli, North Africa
OE5YL	Via A.R.R.L. or R.S.G.B.
OQ5RA	Box 271, Leopoldville, Belgian Congo
PZ1WX	Gerard J. Kooyman, P. O. Box 448, Paramaribo, Surinam, S. A.
SV5UN	Via W3KXS
SVØWF	59 Elmwood Avenue, Long Branch, New Jersey
TI9BR	c/o Puntarenas Brokerage Co., Puntarenas, Costa Rica, or 1097 Washington Street, Colma, California
VO2BP	APO 864, c/o P.M. New York, New York
VP1SJC	Box 186, Belize, British Honduras
VP8AK	J. J. Knox, c/o P.M. Port Stanley, Falkland Islands
VS7AD/VS9	Box 907, Colombo, Ceylon
YK1AF	Via W3KXS
YV5AL	Radio Central, Caracas
ZD4AB	Care of Engineering Branch, GPO Accra, Gold Coast, B.W.A.
ZD4AU	c/o Pan American World Airways, Accra, Gold Coast, B.W.A.
ZS3R	Box 335, Windhoek, South West Africa
ZS9D	Box 14, Francistown, Bechuanaland Protectorate

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115 volt 60 cycle primary.
3200 volts NO CENTER TAP.—New
Two (2) SINGLE PHASE FULL WAVE RECTIFIER CIRCUIT give 2900 volts WITH 300 ma. LOAD. Each..... 8.95
2 for 15.95

540 C.T. at 150 ma., 5 volts at 3 amp.
6.3 volt at 6 amp..... 3.95
880 C.T. at 159 ma., 6.3 volt at 4.5 amp.
1.7 volt at 5 amp..... 4.95

HEINEMAN CIRCUIT BREAKERS

120 volts at 10 amperes..... ..89
120 volts at 20 amperes..... 1.95
120 volts at 30 amperes..... 2.49

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2X2	$ .89	801A	$ .49	813	$ 7.95	6AC7	$ .89	860	$4.95	304TL	$ .90	6SC7	$ .89
5Z3	.79	866A	1.39	6L6	1.25	807	.89	6SH7	.89	6AJ5	.89	803	4.95
75TL	3.95	954	.59	717A	.97	810	4.95	959	.59	4E27	12.95	1616	.89
832A	3.95	6SN7	.89	861	12.95	6AK5	.89	VR150	.79	829	3.95	872	1.98
6L6G	.89	6J7	.79	958	.59	VT127A	2.95						

CATHODE RAY TUBES

3BP1	$2.49	5GP1	$2.95	5HP4	3.95
5BP1	2.95	5BP4	2.95	5FP7	3.95

FL-8 Audio Filter (new)..... $1.79
DC Ammeter 60—0—60 (new)..... .97

CHOKES FOR MEDIUM POWER "B" plus SUPPLIES.

6 henries at 150 ma..... $1.49
10 henries a t150 ma..... 2.19
10 henries at 200 ma..... 3.19

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2 mfd. at 600 volts.....3 for $ .49
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2 mfd. at 2500 volts..... 2.39
1 mfd. at 3600 volts..... 2.95
1 mfd. at 4000 volts..... 3.49
2 mfd. at 4000 volts..... 4.95
3 mfd. at 4000 volts..... 5.45
2 mfd. at 5000 volts..... 5.95

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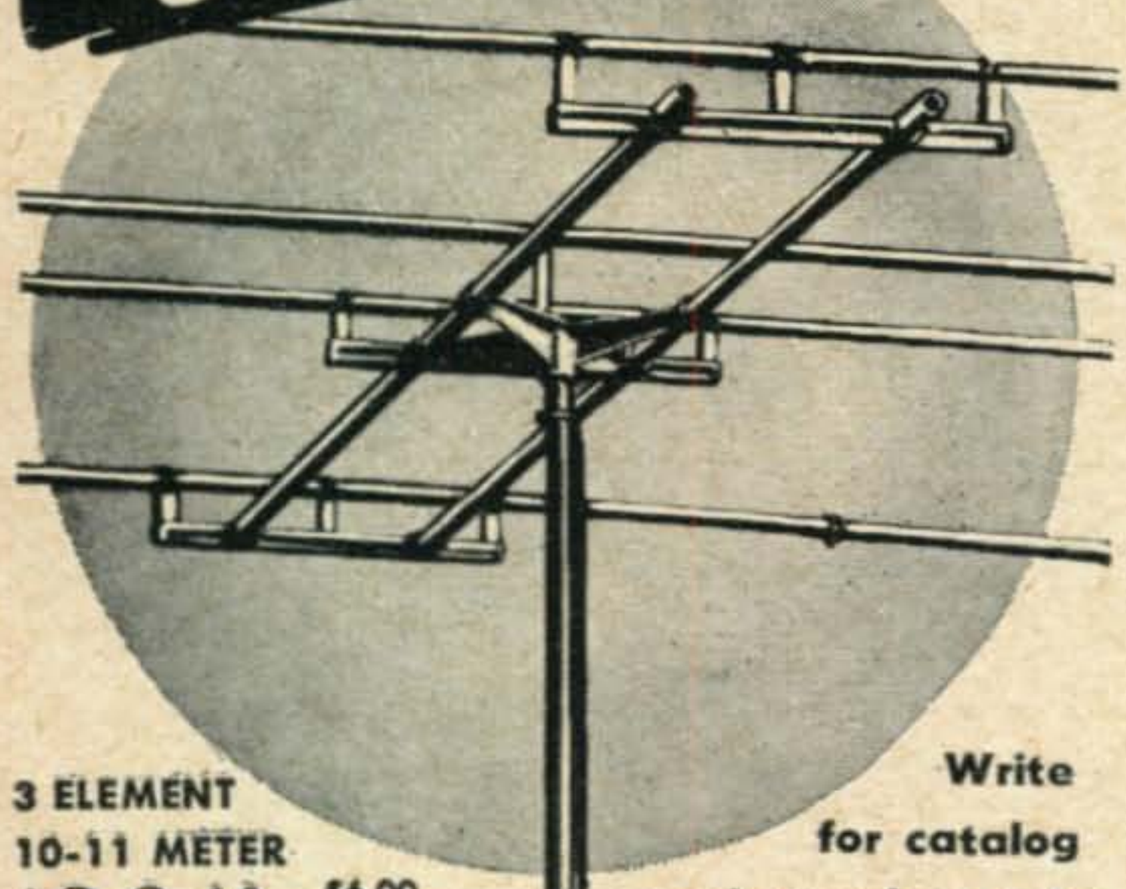

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10-11 METER
$36.40
$6.00 EXTRA FOR FOLDED DIPOLE

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FM REC. BC 603
For 10 and 11 meters. 20 to 30 MC superhet, BFO, squelch; 10 push-buttons and manual tuning. Makes fine wide-band IF strip for 88-108 MC FM with converter. Includes 10 tubes, speaker, case, and diagram. 12 volt. Used, good $12.95

R4—ARR-2 Receiver. SEE RADIO NEWS, P. 112, Jan. 1949 issue. Used, good $10.95

Radio Transmitter & Receiver APS 13
410-420 mc., light weight, fully enclosed; 30 mc., I.F. Complete with 17 tubes, including 5-6J6; 9/6AG5; 2/2D21; 1/XR105. Brand new ... manual $17.95
APS 13 Racks, New $1.00
Handy Talkies Battery ... Good condition. BA-37 .... $ .50
BA-38 ..... $1.00

COMMAND REC.
Used Good

BC453—1.9-55(K $12.95
BC454—3-6-M(..... 5.95
BC455—6.9.1 M 6.95
6½' CONTROL CABLE for above command sets $1.00

APN 1 Used, good ..... $ 7.95
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O	S	C	I	L	L	O	S	C	O	P	E

Answer to crossword puzzle appearing on page 52.

DX PREDICTIONS

(*from page 42*)

Midwest to Balkan Countries

40 meters: Direct route is now almost continuously in daylight polar region. On very quiet ionospheric days, a few signals may break through around 2000 CST. *20 meters*: C.W. on quiet days after 1600 CST, phones break through after 1715 CST. Band not steady and may close sporadically around 2000-2100 CST. Phones go out after 2330 CST, c.w. goes out around 0100 CST the following morning. *10 meters*: No openings predictable. MUF about 20.0 mc.

Midwest to Southeast Asia

40 meters: Direct route is now in continuous daylight. No openings predictable due to normal absorption ratio. *20 meters*: C.W. only with weak signals near the noise level from 0530 to 0745 CST. *10 meters*: No openings predictable. MUF about 19.5 mc.

East Coast to Japan

40 meters: Considerable daylight normal absorption. On a few ionospherically quiet days some signals may break through between 0345 and 0530 EST. *20 meters*: Band opens suddenly with fair signals around 0545 EST. Phones between 0600 and 0645 EST, c.w. audible until 0845 EST. *10 meters*: No openings predictable. MUF about 19.5 mc.

East Coast to Australasia

40 meters: Band opens gradually around 0100 EST. Signals build up until peak from 0245 to 0415 EST. Fadeout around 0630 EST. *20 meters*: C.W. and phones audible around midnight. Good strengths through early morning hours, although only 6 to 8 db above noise level. Band closes suddenly around 0630 EST. *10 meters*: Possibly a few scattered and erratic openings from 1800 to 2000 EST. Not dependable.

East Coast to South Africa

40 meters: Weak signals after 1700 EST. Fair

signals through the atmospheric noise background from 2000 to 2300 EST. Fadeout after 0100 EST the following morning. *20 meters*: C.W. signals break through around 1500 EST. Phones come up after 1630 EST. Peak conditions 1930 to 2230 EST when the band will probably close. Reopens erratically just after midnight with fair signals that slowly fade out by 0230 EST. *10 meters*: Nothing definite, but expect some signals sporadically from 1100 to 1430 EST.

East Coast to South America

40 meters: Signals build up under the noise after 1830 EST. Band consistently open with good signals until 0430 EST the following morning. *20 meters*: First c-w audible around 1545 EST. Phones bothered by high noise levels, but gradually build up after 1800 EST. Band should be open until 0630 EST the following morning. *10 meters*: Slow opening with fair signals around 0915 EST. Signals drop down over 12 db in midday, but peak from 1500 to 1730 EST.

East Coast to Middle East

40 meters: They may hear our signals after 1700 EST; however, noise level on this end is very high and first two-way work should be around 1830 EST. Band fades out due to absorption around 2245 EST. *20 meters*: C.W. after 1315 EST, but phones not until 1700 EST due to the noise level. Peak conditions on quiet days from 1900 to 2130 EST. Fadeout around 2300 EST. *10 meters*: No predictable openings. MUF about 20.0 mc.

MARS ACTIVITIES

(*from page 39*)

became thoroughly conversant with its operation and possibilities. However, a total of seven per cent indicated that they would like to know more.

In recapitulation, the membership of MARS interests follows in sequence: traffic handling, design and construction, u.h.f., antennas, television, radar, guided missiles and facsimile.

LETTERS

(*from page 6*)

Too often have amateurs either entirely abandoned operating; or worse, operated inconsiderately without regard to interference caused thereby. Either choice is unfortunate but the concept of "Cooperate, but Operate" seems to be an equitable and constructive answer.

Congratulations are due you for your work and for your ever improving and useful publication.

Eric B. Edberg, Secretary
Nassau Radio Club

A Memorial Tribute

The doublet feeders hang at ease,
Gently swaying in graceful slack;
The open line now supports a vine,
Growing near the radio shack.

No longer does the flat top sing,
With greetings and 73;
There is but silence, the switch is pulled,
For death hath stilled the key.

Lord, give us faith that there will be,
A place for hams in eternity,
With channels clear, no QRM,
No hate, no envy, no fear . . . toward men.

That we gain may QSO
With those departed, we loved to know,
And have a good old time rag-chew,
And talk about the guys we knew.

With sweepstakes, field days, other joys,
Trunk line networks for the traffic boys;
May each of us strive to reach this goal,
With the Lord in His Glory . . . net control.
CUL Old Man, and 73,

You've an honored place in DXCC,
Your race is finished . . . ours still to run,
'Till our key is silenced, God's Will Be Done!

William B. Derrick W2UXT

"It's KENYON Transformers For My Rig Because They Always Put Out!"

- Hams everywhere specify KENYON "T" Line Transformers! Manufactured under rigid standards, all KENYON transformers are constructed of the finest grades of material plus the skill and long experience of a highly trained competent operating staff.
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SOUND POWERED Headset & Mike & Cable incl Carbon Throat Mike & Batty Case ALL in one NEW Ready to Operate ea. **$10.98**; Per Pair (2), **$19.49**

BC456 Modulator AS IS less tubes . . . . . **98¢**

RADIO-SONDE AN/AMQ-1 72.2 Mc Xmtr Using 3A5 FM HF BRAND NEW Complete w/ultrasens Relay, Hygrometer, Temp Ind & diaphragm actuated Bellows BAROSWITCH mechanism in Orig. Carton. Less Batty . . . **$4.49**

For Your Mobile Rig! 30 Cm/12" ANTENNA Can be adapted to Citizen's Band Coax Term Hi Freq Insul Silv Pl Cont AT1/APN2, AT5/ARR1 w/waterpf gask, flange & ALL hardware for MOBILE mtg BRAND NEW!
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Write for Antenna List

FL-5 Filter Range or Voice, filters 1020 cycle audio Exc for CW work w/switch & diag . . . **98¢**

Cord CD277 w/PL114 for Sekt SO4 Rcvr BC312-314-342-344 NEW O'Seas Pckgd **$1.98**

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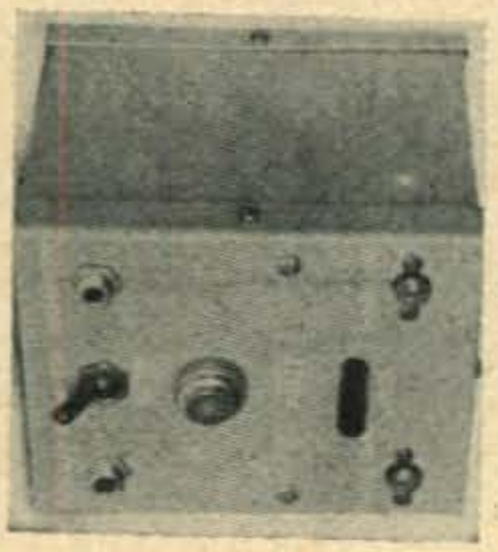

These two new LYSCO emergency or mobile transmitters are only 4 inches x 5 x 5½. MODEL 129: Frequency 27-29.7 Mc. Emission A-3. Power output, 8 watts. Crystal 7 or 9 Mc. MODEL 175: Frequency 3750-4000 Kc. Emission A-3, Power Output 8 watts, Crystal 3750-4000 Kc. Tube complement for both models is 3 6AG7. Power requirements are 6.3 volts AC/DC at 2 amps. 350 Volts DC -110 Ma.
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CURE YOUR TVI

(from page 25)

To eliminate type two it is necessary to (1) reduce the generation of harmonics as much as possible; (2) prevent their radiation by your feeders and antenna; (3) prevent their radiation from your transmitter and wiring itself including the 117-volt a-c line.

To eliminate type four, each source of TVI must be identified and cured separately.

Final Examination

Question: Have you eliminated your TVI?

If the answer is "yes," you have passed the course with 100% grade and may secure your diploma.

If your answer is "no" you may apply for readmittance to the course next term after supplying satisfactory proof of having studied all literature pertaining to the "art of amateur radio."

Postscripts

Press Broadcast Offers Code Practice

Anyone looking for over-the-air code practice may find the WPG press broadcasts helpful. This station broadcasts at 20 w.p.m. on 6380 kc daily except Sunday at ØØØØ GMT. Transmission is by automatic equipment and is held constant in speed.

FCC Apprehends Illegal Operators

Another case of the vigilance of the FCC in apprehending operators transmitting illegally on the amateur bands occurred recently in California. According to the FCC report:

"Three stations had been heard by FCC monitoring stations while using amateur calls which had not been assigned by the Commission.

"Long range direction finder bearings, obtained by Commission monitoring stations in over 10 different states, indicated that two of the stations were located in the Los Angeles area and that the other was located in the vicinity of Portland, Oregon. Specially-equipped direction finder cars were then dispatched to the areas in question and the unlicensed stations were located. When the locations of the stations were determined, watches were synchronized and one of the stations in Los Angeles and the station in Portland were closed down simultaneously. The third station was closed a few minutes later.

"The station operated by Moreno had been using the call, W6EZR. The three illegal operators were informed that the penalty for violation of this federal statute, the Communications Act of 1934, as amended, is a fine of $10,000 or two years' imprisonment or both.

"On June 22, 1948, Moreno took and failed the amateur code test. On July 20, 1948, the Los Angeles office was informed that Moreno, still unlicensed, was again active, but this time in the amateur 20-meter phone band.

"Investigation was immediately initiated by the

Commission's Engineer in Charge at Los Angeles. Moreno's transmissions were also intercepted by the Commission's long range monitoring stations as well as locally. The illegal station used various W6 calls, and communications were primarily with amateurs in Mexico.

"On August 9, 1948 Moreno was taken into custody and his equipment was seized. On the same day he was arraigned before the U. S. Commissioner and on December 8, 1948 he was indicted by the Grand Jury. On December 14, 1948 he pleaded guilty to having operated a radio station without a license and was fined $50."

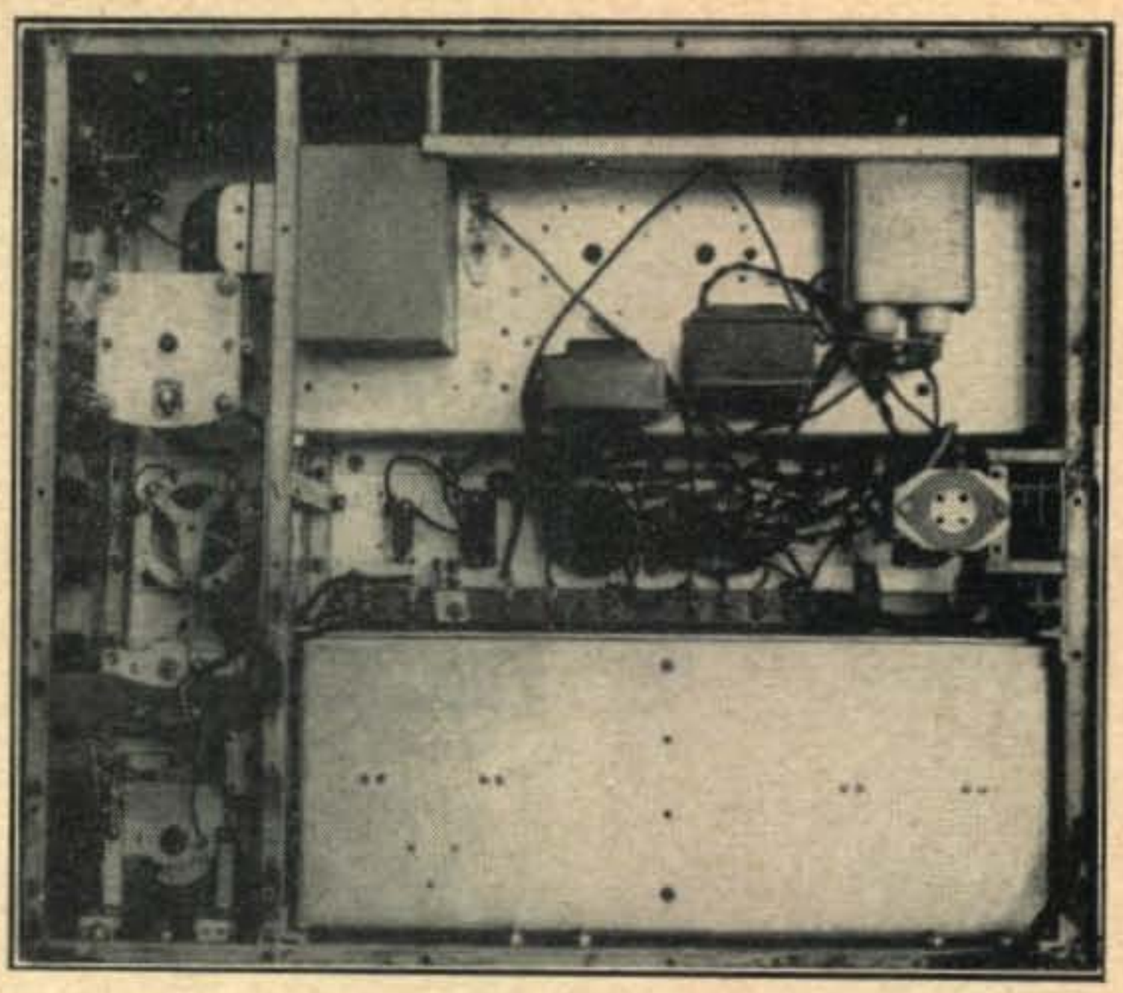
THE BC-375E

(*from page 27*)

socket and the plug-in coil socket. The octal socket for the 6L6 is mounted on the other side of the center shield and is supported by a bracket.

Wiring of the drawers is shown in *Fig. 2*. On 80 and 40 meters, the 6L6-826 combination works straight through, while on 20 meters, the 6L6 is used as a doubler from 40 meters. On 10 meters, a 14-mc crystal or v-f-o input is used with the 6L6 again doubling.

The 60-ma pilot light assembly, *P1,* in series with the crystal is mounted on the front panel of the drawer to the right of the tuning wheel "B." Directly underneath the tuning wheel is a ceramic octal socket. This is used to plug in crystals, or if v-f-o operation is desired an old octal male socket with *pins 3* and *4* shorted together is inserted,



Rear view of the converted 375E transmitter frame. All of the original wiring has been removed, except some of that in the antenna tuning and loading compartment at the left. The four prong socket is used to feed the external high voltage power supply into the transmitter.

thus coupling the grid of the 6L6 to the coax connector on the front panel of the transmitter frame. Underneath the ceramic socket is a phone jack for inserting the keying plug. The key click filter is mounted on the center shield wall. It will be found very convenient to have a grid current indication for the 826. This is provided by the 150-ma meter

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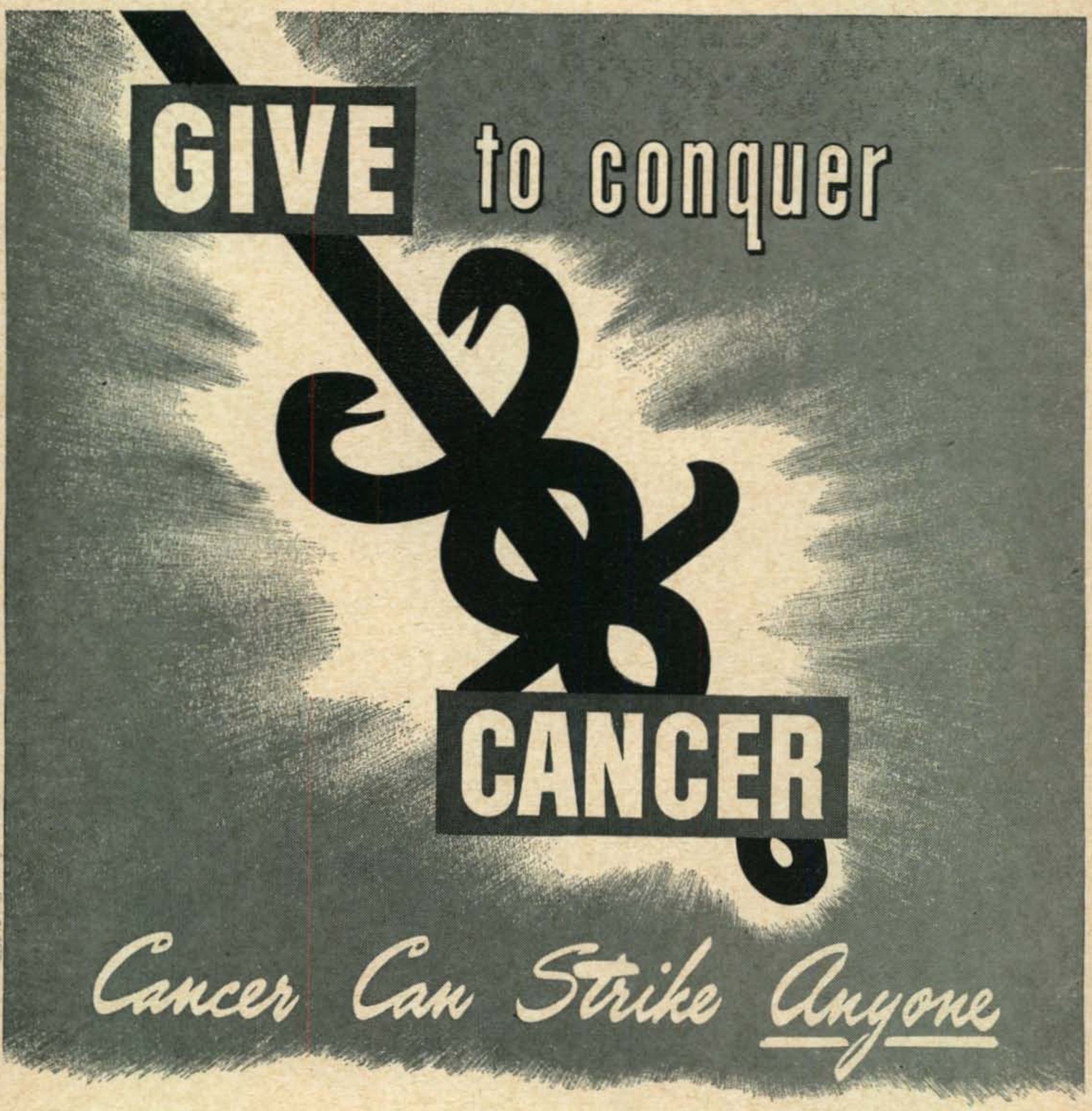

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mounted on the panel of each drawer. This meter is in the circuit at all times.

Tuning up is straighforward and orthodox. The 826 is neutralized by adjusting *C7*, which is a Millen 15001. Together with the plug-in coils, these parts are the only ones purchased new. All others either came from the original transmitter, or are commonly available on the surplus market.

YL's FREQUENCY

(from page 52)

summer. "Have written six books," she adds, "and for the past two years have been doing free-lance magazine and newspaper writing and photography. Photography, both movie and still, has been another of my hobbies for many years, and I have my own darkroom. Combined with writing, it has threatened to become my vocation."

"All this, plus raising two swell boys, getting three meals a day and keeping up a ten-room home, has kept me very busy. So far, I am the only ham in the house, although Charles, the twelve-year old, likes to work the rig and now my OM chats with the gang on 10 phone.

"This is my twentieth year on the air, continuous operation except for the war years," Helen concludes, "and I wouldn't trade my radio knowledge and station for a million!"

Gabfest and Dit-Dah Special

That's it, gals, another YLRL contest. Dates are May 24-26, 1949, with the contest to begin at 6 a.m. local time Wednesday, May 24, and end at midnight local time on Friday, May 26. According to vice president Lou Littlefield, W1MCW, only YLRL members are eligible to compete, and the rules will be the same as applied to the Ninth Anniversary Party (see October, 1948, *Harmonics*). Certificates will be awarded to the contestant having the highest score in each of the ten U. S. districts; also G, VE, KH6, KL7, etc. Mail scores not later than June 5 to W1MCW.

Speaking of contests, you'll be interested in the accompanying photo of Annette Thompson, W4LKM, the consistent winner in recent YLRL events.

Annette Thompson, W4LKM, displays the Littlefield Cup, gift of W1MCW to YLRL, awarded to her as winner of the Anniversary Party last November.

Taken especially for *CQ*, the pic shows Annette with the Littlefield Cup, awarded to her for high score in the Ninth Anniversary Party. Ten inches high, of gold with brown base and handles, the cup is inscribed: "Littlefield Cup, YLRL, Anniversary Party, W4LKM, 1948." "It is a beautiful

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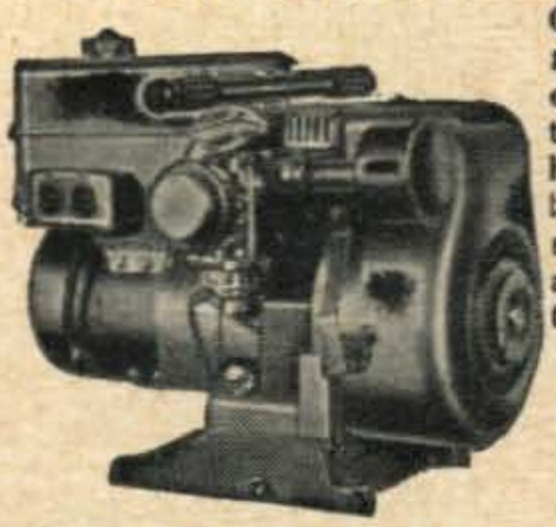

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thing," writes Annette, "and a cup that any of the girls would be mighty proud to win."

Annette, by the way, has been licensed since the summer of 1941. She and her OM were living in Baltimore at the time, and she received the call W3-JTQ. Soon afterward her OM was ordered to active duty in the Army and they moved to Ft. Benning, where they just about had the rig set up when Dec. 8 came along with all amateurs ordered off the air.

It wasn't until January, 1946, that Annette actually got on the air, at this time from Warrenton, Va., on 10 phone. She and her OM were both operating the same rig, but with the confusion of two logs and keeping the QSL situation straight, they decided to use only his call, W4CWV. This they still do. In the fall of '46 when her OM was returned to civilian life they moved to Miami. For a time they operated on the north side of Miami next to an airport (with both aircraft and automobile ignition interference), and then moved to their present QTH in South Miami, which, according to Annette, is one of the best receiving locations they've ever used. Her Class A was received in 1948.

The rig at W4LKM-W4CWV consists of push-pull 6L6Gs with about 80 watts input. While Annette operates v.f.o., her favorite frequency is 28,-920. The receiver is a Breting 14 with a VHF-152 converter. The antenna is a 3-element beam on a 30-foot pole.

"We have done fairly well with this low power," explains Annette, "and have 97 countries confirmed toward DXCC. We have WAS and WAC, WBE, and BERTA, and I am a member of RCC."

Annette joined YLRL in the spring of 1947, and has run up an impressive score in the contests since then: 1st in the Christmas Party on the Air, 1947; 3rd for phone in the Leap Year Celebration, 1948; 1st in the Get Acquainted Party, 1948, and finally was awarded the Littlefield Cup for first in the Anniversary Party, 1948. A faithful member of the 10-meter Tuesday afternoon round-tables. Annette also has 33 states confirmed toward WAS/YL.

N. Y. C. YL Club Hamfest

The YL Club of N.Y.C. is sponsoring its first hamfest on Monday, May 16. All YLs, XYLs *and* OMs are invited. The hamfest will be held at the Hans Jaeger Restaurant, 85th St. and Lexington Ave., beginning at 7 p.m. and will include dinner (your choice of fried chicken or broiled swordfish, and please specify your preference when ordering your tickets), door prizes and interesting speakers, including FCC Inspector Arthur Batchelor and Gay Milius, W2NJF, alternate director for the Hudson Division. Tickets are $3.25, which covers *all* charges, and may be obtained in advance from Ruth Siegelman, W2OWL, 1414 Wythe Pl., New York 52; or Sophie Lash, W2QGK, 150 Snediker Ave., Brooklyn 7, N.Y. Come yourself and bring your friends—there's plenty of space and there'll be lots of fun. See you there.

Just a reminder, gals. Hope to see a lot of you at the New England Division ARRL Convention at Framingham, Mass., at the Nevins Memorial Hall. There will be a special session for YLs and XYLs.

Personal Mention

Best wishes to the YLs holding these newly issued calls: W2ZPY, Dorothea Seaver; W6FEA, Gertrude Cassady; W8DQO, Marguerite Beneditz; W2ZRO, Mary Torpey; W9GHO, Gloria Harvey;

WØPKE, Martha Faubion; W2ZTS, Irene Wawryski; W8DWK, Margaret Rank; WØRAI, Claudia Gibson; and W9GME, Grace Ryden.

To be or not to be—DX. Ellen, ex-W6YYM, who has been KH6QI for the past year, is back home in San Diego, while Anna, W7LNF, is now KB6AA on Canton Island.

News both good and not so good from the second district this month. First, congratulations to Lil, W2PMA, and her OM on their 25th wedding anniversary, celebrated March 11th, while condolences to Amelia, W2OLB, on being burned out of house and home—too much r.f., Amelia?

QRR -- YLs

The following comes from Elizabeth Lugg, W9-BRC:

"Can you please help me? For a year I have been a ham and have never made a contact with another XYL, YL, OW, OG, HW, or what have you. I have made over one hundred contacts in five months with various OMs, OBs and HHs (hen-pecked husbands). I work 40 meters and would much enjoy meeting some W9s, 8s or Øs. Will membership in your club guarantee results? The local Four Lakes (Wisconsin) Radio Club restricts membership to men only. Now what do you think they do that for? I don't think I'm a 'lid'—quite."

Don't you agree that something should be done? (Incidentally, W9BRC has now joined up with YLRL.)

SCRATCHI

(from page 8)

Are picking next box up off floor and find are holding only four sides—bottom of box still on floor, loaded down with old transformers. Big job are Class B audio transformer with shorted secondary. This are happening time Scratchi checking audio amplifier when final not on. Others are old xformers from BC sets.

Sratchi are now getting slitely disgusted, but I are continuing to look through rest of cartons hurriedly. One are full of used chassie and odd pieces of bakelite. Another are big snarl of wire. with two coffee tins full of unsorted nuts and bolts.

Hon. Ed., Scratchi are not only having junk box, but it are full of reel, honest-to-gracious 1/c junk. I are coming to conklusion that the guy what are riting article are owning part interest in radio store. As soon as I are getting basement back in orders I are meaning to write him and telling him so.

Respectively yours,
Hashafisti Scratchi

CODE PRACTICE OSCILLATOR

(from page 35)

lamp, which is the same as the Ne-2, but has a single-contact bayonet miniature base. Also, where portability is not required, the 120 volts or more can be obtained from any receiver or amplifier—the microamps drain will never be noticed. Due to the high internal impedance of the oscillator the receiver B+ lead may be isolated through a ¼ megohm or larger resistor. This resistor, which

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should be right at the B+ point within the receiver or amplifier, will raise the internal impedance of the source of d.c., protecting both the user and the power supply. If the supply voltage is high, say 300 volts, additional resistance will have to be added in order to stay within the range of oscillation, and to keep the tone from going too high in audio frequency. A 1 to 2-megohm pot, used as a rheostat, in addition to the 2-megohm fixed resistor within the oscillator unit, will enable selection of a suitable tone.

The outstanding features of this compact, battery-operated code-practice oscillator have already been enumerated. It might be added that this unit (with batteries in box) presents no danger of shock to the operator keying the unit, due to the high internal impedance inside the box. Tests made with a high input impedance vacuum tube voltmeter across the open key contacts showed 45 volts. This voltage dropped very sharply as soon as fingers contacted the key terminals, the better the contact the lower the voltage.

At 120-volts d-c input to the unit, the measured current drain is 25 microamps. The d-c resistance therefore is 4.8 megohms. Several of these units have been built during the past months, all of them using discarded batteries—four No. 413 Eveready units measuring 100 volts instead of 120 volts. One of these oscillators has been on life test for two solid weeks, so far, and is still going strong.

THE SINGLE SIDER

(from page 18)

capacity to couple the output of the b.f.o. to the diode grid. It has been found necessary to slightly increase this capacity in most cases in order to produce a clean c-w beat note. For example, the Collins 75A uses a 1-$\mu\mu$f coupling capacitor from b.f.o. to diode plate. This required augmenting with about three twists of push-back wire to form a supplemental capacity (perhaps 3 or 4 $\mu\mu$f). The same treatment was necessary on an SX-28A receiver.

C-W Reception Notes

There are a great many possible combinations of settings for the b.f.o. on the Single-Sider. An attempt to describe all of them would result in a lot of words and not much understandability. Some combinations will be obvious; set the b.f.o. near one edge of the band-pass or the other, or set it off to one side in the traditional manner and set the carrier to the center of the pass-band. A few minutes of playing will show most of the combinations but perhaps the most significant thing is that it will be possible to interchange sidebands on the beat note by changing the setting of the l-f oscillator, leaving the b-f-o control strictly alone. One can slide signals in and out of the pass-band by this method without changing the pitch of the various signals in any way. They just appear and disappear. The Single-Sider will back up the crystal filter to a fare-thee-well—the receiver tunes in the conventional manner except that no signal

will "hang on." No beat note past 3000 cycles will give much response regardless of setting and when the carrier is set to the center of the pass-band, 1500 cycles, the signal is a "dead duck."

Note in the circuit diagram that there are two variable tuning controls on the l-f beating oscillator. One of these is a 75-$\mu\mu$f variable used for preliminary setting up of the proper beat and the other is a three-plate midget with which setting within the pass-band is accomplished. This smaller capacitor covers only about 6 kc and can therefore be readily calibrated so as to indicate high and low sideband cutoff limits. There are two possible center frequencies to which the l-f oscillator can be set and still produce the required mid pass-band difference. (For 500 kc i.f.—488.5 or 511.5 kc, for 11.5 kc band-pass mid-band. For 456 kc i.f.—467.5 or 444.5 kc, again for 11.5 kc mid-band.) The selection of either the high or the low beat is not important. We set our unit up by using a signal from the v.f.o. in our transmitter. The signal is tuned in on the receiver using a.v.c. and the S-meter to indicate centering within the i.f. of the receiver. The 75-$\mu\mu$f capacitor on the Single-Sider l-f oscillator is then rotated through its scale until the signal is heard in the earphones or speaker. The final setting of this capacitor is one that will permit both high and low band-pass cutoff edges to appear within the range of the three-plate interpolating capacitor. The coil in the Clapp oscillator is a powdered-iron slug-tuned winding from a 456 kc i-f transformer. This was originally shunted with a 100-$\mu\mu$f silver mica and this same capacitor is retained. It may be necessary to juggle a bit with the slug to make the 75-$\mu\mu$f capacitor hit properly.

A final word on actual receiver tuning. Observe which sideband you have selected to cutoff and tune the receiver through the pass-band toward the cutoff. Thus if the low-frequency sideband was selected as the one to be eliminated, one would tune the receiver from high to low. In this way, the re-receiver is tuned through the audible portion of the signal to the sharp cutoff point where an immediate drop in intelligibility is evidenced. Tune just past this sharp drop then carefully back. This will be the correct setting as will be apparent by the clearest sounding response. There is only one dial setting for this maximum intelligibility although the signal can be copied with increasing distortion completely through the pass-band to the drop off on the other side. There is little point in further elaboration on the tuning procedure—if you build a Single-Sider the correct procedure will be obvious after practice. If you don't build one, you won't care anyway. Merely a final word of caution. Tune slowly and carefully. After all, 60 or more db drop in a few hundred cycles *is* considered "sharp."

The writer wishes once again to thank Frank Lynch for his patience and invaluable guidance through some of the rather rugged preliminary phases of the Single-Sider.

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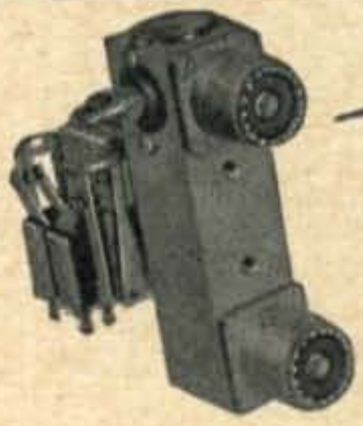

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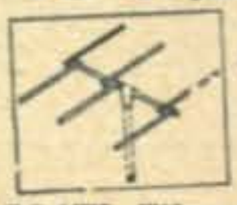
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CITIZENS' BAND

(from page 34)

i.f. using a 6J6 in a grounded-grid (or grid-separation) circuit. The FM receiver used was a Hallicrafters S-58 with the receiver i-f coils detuned to increase bandwidth.

The low input power requirement makes it almost mandatory that high-gain antennas be used in conjunction with Citizens' Radio Service equipment. At these frequencies, a half wave is only about twelve inches, which means that arrays of 24 to 48, or even more, elements would not be too large for practicality. Even simpler antennas showing only slight gain over a dipole make a considerable difference, however. *Table 1* shows the comparative ranges achieved using the two antennas shown in *Fig. 1*.

The main question in the minds of persons interested in the Citizens' Band seems to be, "When is the band going to open?" A telegram to T. J. Slowie, Secretary of the Commission, elicited the following reply:

". . . (Regarding your request for information) relating to the expected opening date of the Citizens Radio Band . . . (the Commission has been issuing) authorizations permitting operation . . . on an experimental basis (since December 1947)."

". . . (The) Engineering specifications . . . were adopted as final . . . December 1, 1947, but . . . licensing rules have not been made final. It is expected that these proposed rules will be adopted as final in the near future.

"The Commission has no additional material available for publication at this time."

160 METER CONVERTER

(from page 39)

It is important to use a shielded lead for this purpose in order to minimize receiver pickup at 4.1 mc.

Testing and Alignment

Connect the B+ lead to a convenient source of 180-250 volts d.c. in the receiver and make the ground and antenna connections to the receiver as well. The center conductor of the antenna lead should go to the receiver antenna post, and the shield to the ground post. If your receiver is of the communications type with a balanced antenna input, ground one of the receiver terminals directly to the chassis and connect the shield to this terminal. Connect an external antenna to the converter using both terminals for a balanced lead-in, and grounding one terminal to the converter chassis if a single wire is used. Now turn on the converter a-c switch, turn on the receiver, and proceed with converter alignment.

Alignment is easy since there are no circuits to track. All you have to do is find the band! If your receiver will tune from 5.9 to 6.1 mc this is very simple. Set the receiver at 5.9 mc. With the converter tuning condenser almost fully meshed and the regeneration control fully counter-clockwise, adjust *C7* until the oscillator signal is heard in the

receiver. Now tune the receiver to 6.1 mc, and tune the converter main dial toward its low capacity setting until the oscillator signal is heard once more. This should occur close to the minimum capacity point of the converter tuning dial. Next set the receiver on 4.1 mc, adjust *C4* on the converter for maximum receiver noise (about half capacity), and advance the regeneration control about half way. Now tune the converter until a signal is heard. With an active 160-meter band you won't have to look far for that signal! In any case, you should pick up the characteristic buzz-saw note of loran. When you hit a signal, peak up *C4* and adjust the front panel trimmer for maximum response.

The converter is now aligned, and all tuning will henceforth be done with the main tuning dial. The mixer trimmer will be used sparingly to peak up signals in widely separated parts of the band, and the regeneration control will serve as a combined gain and selectivity control (both gain and selectivity being maximum just below the point of oscillation).

C1, *C4*, and *C7* all have sufficient reserve capacity on either side of resonance to make up for any normal variations in home-made coils. Therefore no coil pruning should be necessary. The feedback taps on *L2* and *L5* are also relatively non-critical. Hence, should the local oscillator fail to oscillate, make a careful wiring check before you conclude it is necessary to move the tap up another turn on the coil. Oscillation of the mixer will be indicated by a very strong spurious signal in the receiver. The point on the regeneration control at which the mixer breaks into oscillation is determined by the position of *L1*, the value of *R4* and by the tap on *L2*. If you cannot get proper regeneration control by adjustment of *L1*, try different values of resistance at *R2* before rewinding *L2*.

Additional Notes

Sufficient space has been left underneath the chassis to add a simple a.c.-d.c. plate supply if you do not care to take plate voltage from your receiver. A circuit diagram of this supply is shown in *Fig. 2*. One precaution must be observed in its use, and that is to make all converter grounds including the power supply ground to a common bus *insulated from the converter chassis.* Then bypass this bus to chassis with .1 μf. *R4* should be changed to 10,000 ohms and *R6* to 12,000 ohms. Of course the a.c.-d.c. supply will provide only about half the normal 250 volts of B voltage, but overall converter performance will still be excellent.

Some constructors may wish to modify the converter for use with a broadcast receiver at their summer homes or on field day. To do this, a 1500 kc i-f transformer, modified to provide a low impedance secondary, may be used in place of the present output circuit. The local oscillator tuned circuit must also be modified to tune from 3.3 to 3.5 mc when using a 1500-kc intermediate frequency.

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FOR SALE: HT-9 transmitter, in excellent condition; coils for 80-20-10 m., spare tubes, instruction book, crystals—$250. L. F. Brown, W2JJD, 37-30 81st Street, Apt. D-5, Jackson Heights, L.I., N.Y.

GOLDEN OPPORTUNITY—it all must go. Transmitter: Millen Vari-arm and exciter, VT127A, pr. VT127A's, commercial speech amp., class B 805's, built-in 72 x 29 x 24 inch surplus Wilcox steel cabinet, capable 1 kw; ART-13; TBS-50; Meissner signal booster; VHF-152; link police mobile rig. All offers considered and answered. James C. Bailey, W9CLP, Macomb, Illinois.

FOR SALE: Collins 75A receiver 6 months old, excellent condition, $300.00. J. A. Selvidge, WØOMG, Poplar Bluff, Mo.

WANTED: 2 sets of Group I coils, 1900 kc. to 3600 kc. for Wilcox F-3 receiver. WØCFX, Bob French, 524 So. Holbrook, Ft. Scott, Kansas.

SELL: NC240CS receiver and speaker, excellent condition, $150.00. W. Gago, W9FVU, 743 S. Highland Ave., Oak Park, Ill. Euclid 3884R.

R-9er circuit and theory wanted. GE Ham News Vol. 1, No. 4 if possible. W. Ellinwood, W9GWH, c/o Radio Station WAD, Grafton, Wisconsin.

FOR SALE: Pair of new 810s, $11.00. WØWIT.

FOR SALE: BC348Q converted to 110 v. 6AK5s in r-f stages, separate r-f and a-f gain controls, noise limiter, 5 meter, speaker in separate case, power supply in speaker case with technical manual. Excellent condition. $100.00. WØWIT.

FOR SALE: BC654 complete with receiver, vibrator pack and spare set of tubes, mike, speaker, power cable and technical manual—$30.00. WØWIT.

FOR SALE: BC654-A U.S. Army transmitter and receiver, not converted. Price $10.00. Mrs. F. MacDonald, 849 Saratoga St., East Boston, Mass.

FOR SALE: BC222. Walkie talkie for 6 and 10 meters with tech manual and antenna. $20.00. WØWIT.

N.Y.C. HAMS: Come see my station for sale. 250 watt fone, rack panel, all band rig, 10 meter workshop beam, 80 meter v.f.o., HQ129X with built-in NBFM and frequency standard. Rig built 1948 and has W.A.S., W.A.C. and 52 countries. W2QQF, Phone HY 2-8456.

LOW NOISE VHF CONVERTERS as described in March CQ available in limited quantity. Wired and tested, less tubes, $40.00. Deluxe model in cabinet with regulated supply and calibrated dial, less tubes, $70.00. John E. Stacy, 84 Faun Bar Ave., Winthrop 52, Mass.

FOR SALE: WRL Globe King xmtr., factory-built, c.w. only, with tubes and four sets of coils for 80, 40, 20, and 11-10 meters—$225; factory-built Meissner signal shifter with FMX phase modulator built in and power supply with all tubes and connecting cables—$75; rack panel and power supply cabinet with hardware for signal shifter—$7; and an Astatic JT-30 xtal mike complete—$8. Bulk order price—$300. Individual order items sent prepaid; bulk order sent collect. Correspondence invited. Write to Vernon V. Drake, W9BWE, 815 Harrison Street, Charleston, Illinois.

FOR SALE: ART-13 Collins, almost new—$200.00. Will prepay express. W7LOP, 739 Homer, Seattle 8, Wash.

WONDERFUL FOR BEGINNER: McMurdo Silver Atom-X receiver. Built into conveniet carrying case, complete with coils for 20, 10 and 6—power supply, head phones, all new—bargain—$30.00. John Rogers, 8500 4th Avenue, Brooklyn 9, N. Y.

HRO5TA1 RECEIVER: 500 kc. to 30 mc. Excellent condition, like new. Includes receiver, power supply, speaker, and six coil drawers. Electrical band spread feature. $225 complete. Original owner. GI student, must sell. Guaranteed. Write for terms. Charles Bergman, 68 Elm, Potsdam, N.Y.

SELL 850 WATT AM, FM and CW xmtr, good design. Deluxe Par-Metal cabinet and dolly. Single 4-250A final, 10, 15, 20, 40 and 80. 2 blowers, 2 vacuum cond. B&W coils and butterfly cond. Bias supply 2E26 bandswitching buffer and HT-18 VFO with 5 crystals, commercial mod. and speech. P.P. parallel 811s. Thordarson 500 watt mod. xfmr. 50 watt class "A" speech amplifier with compression-clipping and a high level negative peak clipper. 8 Triplett 3" square meters, Coax relay, 872 rectifiers, 2 Thordarson 500 ma chokes, 4 Pyranol 2 mfd 4000 volt cond. Amertran plate xfmr. Heavy duty 60 amp relay. SX42 with tilting stand. Jensen deluxe baffle with JCP40 speaker. VHF152A, R9er and coils for 10 and 20. 10 meter 3-element beam and ground-plane antenna. D104 mike and "G" stand. $1200.00 f.o.b. Mobile, Ala. Prefer selling complete. Will consider other offers. 25c for photos. Hank Bailey, W4IKM, 1312 Windsor Ave., Mobile 18, Ala.

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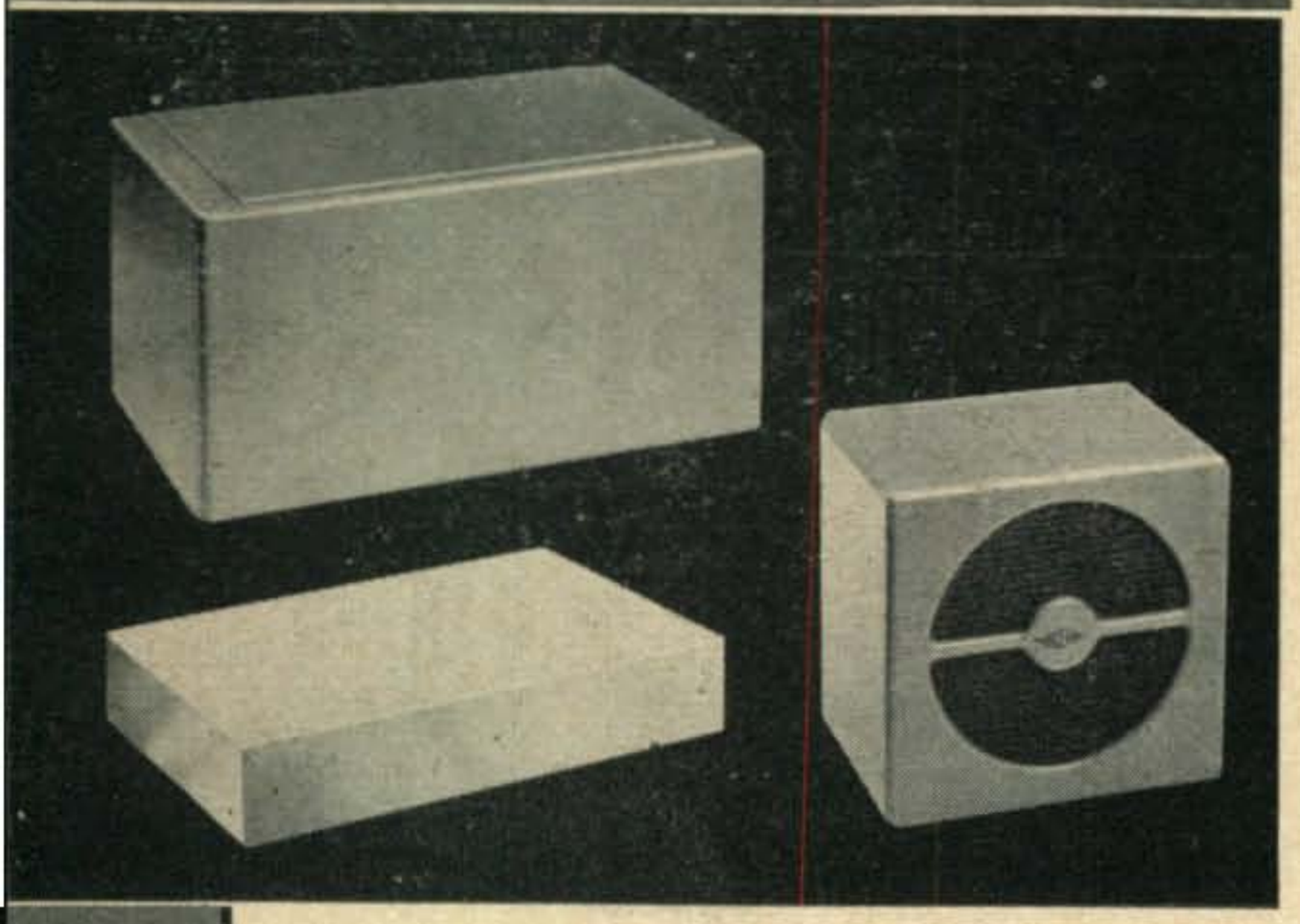

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Max.-Signal Plate Current	350	313
Driving Power	6	4.4
AF Power Output	310	340

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DC Grid Voltage	—120	—115
DC Plate Current	346	280
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